2020

Analytic Threads - Annual Newsletters 2014-2020

Messiah University

MESSIAH COLLEGE

Annual newsletter of the Department of Information and Mathematical Sciences

ANALYTIC THREADS

FALL 2014

News from the department faculty

Angela Hare
In January 2014, Dr. Angela Hare and three students traveled to Burkina Faso for site work as part of their Collaboratory project. See details in the Collaboratory News section. Dr. Hare was also selected to be a Smith Scholar Intern Mentor for 2014-2015.

Niklas Hellgren
In May 2014, Drs. Niklas Hellgren, a native of Sweden, and his wife Alison Noble (Chemistry and Biochemistry), led 21 students on a cross-cultural trip to Sweden and Norway. In addition to experiencing the general sights and culture, students visited waste management facilities to learn about sustainability and recycling practices and also a European Union Parliament polling place. They also learned and played traditional Viking games (not NFL sanctioned or affiliated) like varpa and stångstörtning.

Drs. Hellgren and Noble were awarded a Messiah College Cross-Cultural Grant to explore the enhancement of the Scandinavian cross-cultural course by adding Iceland to the current experience. The two of them visited Iceland before returning home from the May trip to Scandinavia.

Abaz Kryemadhi
Dr. Abaz Kryemadhi was awarded a summer 2014 Visiting Faculty Grant from the U.S. Department of Energy. He and students Matthew Bressler (Physics '16) and Katrina Schrock (Physics '16) worked in Chicago to prototype a neutron detector for the Cryogenic Dark Matter Search Experiment. The team collaborated with Fermi National Laboratory. This is the third consecutive year in which he received this prestigious grant award.

Dr. Kryemadhi also received a Messiah College Course Development Grant to develop a new course (PHYS 401 – Particle Physics) for the physics degree. This course will be offered for the first time in fall 2014.

Douglas Phillippy
Drs. Doug Phillippy and Brian Swartz (Engineering) were awarded a Messiah College Teaching Enhancement Grant to develop primer texts for two courses. A primer text is written specifically for students new to the subject matter in a course to prepare them for each topic area. In fall 2014, they will pilot the concept in one engineering course (ENGR 351 – Analysis and Dynamics of Structures) and one mathematics course (MATH 111 – Calculus I).

For the past five summers, Dr. Phillippy has helped to lead a team on a short-term mission trip to Belize. On these trips, the team stays at Hosanna House, a home for abused children. This home is part of a local ministry, Here's Hope Ministries. Dr. Phillippy's team interacts with the residents of the home, runs a Vacation Bible School for local children, and performs maintenance on some of the buildings at the site (http://www.hereshopeministries.org/home.html).

Samuel Wilcock
On Aug.7, 2013, Dr. Sam Wilcock was an invited panelist at the Joint Statistical Meetings in Montreal, Quebec. "Is the 'World' Ready for a Simulation Approach to Introductory Topics?" was the topic addressed by the panel. In May, he presented at the on-campus workshop, "Universal Design for Learning."

Dr. Wilcock published the following article this past year: Lindquist, E., Foster, D., Wilcock, S., and Erikson, J. (2013), "Rapid Assessment Tools for Conserving Woodland Vernal Pools in the Northern Blue Ridge Mountains," Northeastern Naturalist, 20 (3), 397-418 (http://www.eaglehill.us/NENAonline/articles/NENA-20-3/11-Lindquist.shtml).

In June, he spent another intense week grading Statistics AP exams. This was his seventh year. Several Messiah alumni joined him in this endeavor.

Faculty news, continued on page 2

Retired faculty news

Robert Barrett

Each semester, Professor Robert Barrett teaches one or two laboratory sections of PHYS 201 & 202 – Introductory Physics I & II.

Last fall, Professor Barrett completed his 2,000th kayak trip. Most of his trips are of a ministry nature designed so that others can enjoy God's creation from the perspective of a waterway. He continues to be the Outdoors Club advisor at Messiah College – a position which he has held for more than 19 years.

Gene Chase

Dr. Gene Chase authored an essay reviewing and summarizing "Ideas at the Intersection of Mathematics, Philosophy, and Theology" by Carlos R. Bovell which is a book of essays on phenomenology, mathematics, and theology. Dr. Chase's essay was published in Journal of the ACMS (Association of Christians in the Mathematical Sciences), 7, 1-8 (http://www.acmsonline.org/journal/2012_2013/Chase2012.pdf).

He continued as a consultant for SymBionyx (http://symbionyx.com/), whose WERCware products are being tested by Collaboratory students. WERC is an acronym for Wearable Enabled Remote Co-presence. Among the applications is one that allows employees on the autism spectrum or with post-traumatic stress disorder to be productive receiving only minimal noninvasive remote help. See the Collaboratory News section for more details.

In spring 2014, Dr. Chase taught MATH 392 – History of Mathematics and directed an independent study in MATH 491 – Philosophy of Mathematics.

Welcome

In fall 2014, Dr. Christine Robinson joins the IMS department as assistant professor of mathematics filling the position vacated by Dr. Christopher Staecker in 2009. She comes to Messiah from her position as a postdoctoral fellow at the Einstein Institute of Mathematics at the Hebrew University of Jerusalem. Dr. Robinson completed her Ph.D. in number theory and automorphic forms at the University of Illinois at Chicago in May 2013. She received her M.S. in Mathematics from the same institution and her B.S. in Mathematics from Wheaton College. In summer 2011, Dr. Robinson was part of a research group in arithmetic geometry at Humboldt University in Berlin, Germany. She is a native of Syracuse, N.Y.

In Memory

Retired professor John Seymour died on April 24, 2014 in Denton, Tx., at the age of 85. After retiring from IBM in June 1987, he spent two years teaching computer science in what was then the Department of Mathematical Sciences at Messiah. Professor Seymour was very physically active. When he joined our department, he was still recovering from an injury he sustained while body surfing in California. Several present and former Messiah faculty members will testify that Professor Seymour's physical appearance and movement were quite deceptive belying the trouncings inflicted by him in racquetball.

Department news

Physics

The physics (B.S.) program is no longer a split program between Messiah-Grantham and Messiah-Philadelphia. It is now housed completely in Grantham. Currently, three students are enrolled in the B.S. program. The physics (B.A.) and physics with certification (B.A.) programs have always been housed completely in Grantham.

New Address—Reminder

Effective July 1, 2012, Messiah College's mail-receiving post office changed from Grantham to Mechanicsburg. As a result, the address for all IMS Department faculty members is as follows.

Name
One College Avenue, Suite 3041
Mechanicsburg PA 17055-6807

Support opportunities

Your continuing support of Messiah College in all ways is greatly appreciated. With respect to financial support, some of you may wish to target donations to specific projects related to the department. Of course, your gift is doubled when your employer has a matching gift program. Consider a gift to the College that is earmarked as described below. Send your tax-deductible gifts to Office of Development, One College Avenue, Suite 3013, Mechanicsburg, PA 17055-6807.

- To make a donation to the Department of Information and Mathematical Sciences, put 'Info/Math Science Dept.' on the memo line of your check written to 'Messiah College.'
- To support the Collaboratory Education projects, put 'Collab. Education Group' on the memo line of your check.
- If you are interested in contributing to a scholarship for students in the IMS Department, contact the Office of Development. It takes $25,000 to underwrite (seed) a scholarship.
- If you are interested in contributing to an endowed scholarship chair for faculty members in the IMS Department, contact the Office of Development. It takes $2 million to underwrite an endowed scholarship chair.

Student news

Honors


Arndt

Billie Arndt '14 (Mathematics with statistics, studio art, and art history minors) graduated with department honors in mathematics. Her project was titled "Correlation: Beginning History through Development of Function."


Musselman

Matthew Musselman '14 (Computer and information science with computer science and software development concentrations) graduated with department honors in computer science. His project was titled "Designing a Reporting and Analysis Engine for the Intelligent Water Project (IWP)."


Smith

Rebekah Smith '15 (Computer and information science) was awarded the Crystal Meck Evans Scholarship for the upcoming academic year. This $1,000 award is given annually to a female student majoring in one of our CIS fields. Rebekah's academic strength, service to the department, commitment to a career in computer science and cocurricular activities made her a strong candidate for this year's award. She was also last year's recipient.

Summer Activities: Research Experiences for Undergraduates (REU's) and Internships


Chua

Phoebe Chua '16 (Mathematics) participated in an REU in mathematics at The Pennsylvania State University. Her research project involved working in max-plus algebra (http://www.math.psu.edu/mass/reu/2014/).


Ritenour

Laura Ritenour '16 (Mathematics/molecular biology) attended the Summer Institute for Training in Biostatistics (SIBS) at the University of Pittsburgh (www.publichealth.pitt.edu/biostatistics/research-and-practice/sibs).

Class of 2014: Employment and Education Placements (to date)

Billie Arndt (Mathematics with statistics, studio art, and art history minors): pursuing a master's in medical statistics at University of Leicester in Leicester, England


Boyle

Meghan Boyle (Mathematics with statistics and business administration minors): pursuing a master's in biostatistics at Georgia State University


deGruchy

Avery deGruchy (Computer and information science with computer science and software development concentrations): employed as a intelligent water project specialist by the Collaboratory for Strategic Partnerships and Applied Research at Messiah College, Mechanicsburg, Pa.


Demmer

Scott Demmer (Mathematics): employed as a project manager by Epic Systems, a health care information technology company in Verona, Wisc.


Jablonski

Kathryn Jablonski (Mathematics with a statistics minor): employed as a report writer by Pennsylvania Higher Education Assistance Agency in Harrisburg, Pa.


Kang

Ha Ram Kang (Mathematics with certification): employed as a mathematics tutor by Selahart Institute in Lancaster, Pa.


Kantner

Zachary Kantner (Business information systems): employed as a service desk analyst by Distributed Systems Services in Wyomissing, Pa.


Kennedy

Jonathan Kennedy (Computer and information science with computer science and software development concentrations): employed as a junior .NET developer by Computer Aid in Harrisburg, Pa.


Moyer

Gregory Moyer (Computer & Information Science with Business Information Systems and Web Management concentrations): employed as an Applications Developer by Candoris Technologies in Annville, Pa.

Matthew Musselman (Computer & Information Science with Computer Science and Software Development concentrations): employed as a Junior Software Developer by SimVentions, Inc. in Fredericksburg, Va.


Myers

Aaron Myers (Mathematics with certification): employed as a high school mathematics teacher by Bayside High School in Virginia Beach, Va.


Olchewsky

Kevin Olchewsky (Business information systems): employed as a business programmer analyst by Martin's Famous Pastry Shoppe in Chambersburg, Pa.


Sheeler

Benjamin Sheeler (Computer and information science with business information systems and software development concentrations): employed as a software developer by Computer Aid in Harrisburg, Pa.


Sprengle

Jacob Sprengle (Mathematics with certification): pursuing a master's in higher education at Messiah College and employed as graduate assistant coach by Messiah College baseball


Tansey

Meaghan Tansey (Mathematics with certification): employed as a high school mathematics teacher by Dauphin County Technical School in Harrisburg, Pa.


Waidelich

Gregory Waidelich (Mathematics with certification): employed as a high school mathematics teacher by Clearfield High School in Clearfield, Pa.

Rebekah Curtis '16 (math with certification) in the Gobila village school in Burkina Faso, West Africa in January.

Classes of 2006 and 2007: The Rest of the Story

Students in our department, **Brian Bargh '07** (Mathematics), **John Chase '06** (Mathematics with certification), and **Matthew Wright '06** (Mathematics) solved the Icosahedron Coloring Problem. Their solution incorporated concepts from basic geometry, group theory and combinatorics. It was published in the April 2014 edition of Math Horizons. (Mathematics and mathematics with certification alumni may recall receiving Math Horizons as students courtesy of our department.) Here are the bibliographic details: "Colorful Symmetries," Math Horizons, 21 (4), 14-17 (http://www.jstor.org/discover/10.4169/mathhorizons.21.4.14?uid=29403&uid=3739864&uid=2&uid=3&uid=29402&uid=67&uid=62&uid=3739256&sid=21104454542073).

Collaboratory projects

Department faculty and students have been heavily involved in projects within the Collaboratory for Strategic Partnerships and Applied Research (messiah.edu/collaboratory/).

Yako Education Project

Curtis

The ongoing Collaboratory Education Group work in Burkina Faso, West Africa continued this year with a new project: the Yako Education Project (YEP). In January, three students and Dr. Hare served as consultants and observers in the Gobila and Wendkingo schools operated by Burkina Faso Outreach (http://bfoafrica.org/). In student-led training meetings with local teachers, the school staff learned how to teach essay writing, abstract thinking skills and improve spelling proficiency, particularly for 5th grade children. Rebekah Curtis '16 (Mathematics with certification) was one of these students, and for 2014-2015 she was chosen to be a Smith Scholar Intern. With this paid internship, she will be working with Dr. Hare to produce a French, Christian mathematics primer for BFO schools in the greater Yako region.

Artificial Neural Network Project

Clemens

Dr. Chase advised Collaboratory student Chad Clemens (Engineering '14). Chad's project was to build an automated real-time system capable of helping a job coach distinguish a worker's positive and negative stress on the job. Before Dr. Chase became involved, Chad had tried unsuccessfully to use galvanic skin response (GSR), as polygraphs (lie detectors) do. Dr. Chase suggested using voice, and beginning with an easier contrast for testing purposes, namely to distinguish between male and female voices. Chad trained an artificial neural network (ANN) to input a frequency analysis of voices and output the gender of the speaker. Chad's system correctly identified the gender of the speaker 95% of the time. Future Collaboratory work will first train the ANN on pre-recorded voice samples with known positive and negative stress; and second, combine the results with GSR on live subjects in real time to increase predictive accuracy.

Above: Dr. Rohrbaugh teaches CIS students.
Top right: David Janczyk '12 analyzes data while working on a project for Daybreak Church.
Right: Matthew Hoover '12 and Matthew Gusick '13 work on a project for the Agapé Center.

Future events

Homecoming "+/- 3 Breakfast"

Saturday, Oct. 18, 2014

All 2012, 2013 and 2014 IMS department graduates are invited to brunch at Brothers Restaurant from 9-11 a.m. during Homecoming on Sept. 18. Department students in their 2nd, 3rd and 4th years will also be invited. Email our administrative assistant, Jean McCauslin (JMcCausl@messiah.edu) by Oct. 10 if you would like to attend.

Alumni mathematics teacher dinner

Monday, Nov. 17, 2014

Each fall, our MATH 407 (Professional Issues in Secondary Mathematics Education) class of current student teachers invites alumni who are middle or high school mathematics teachers to join them for dinner. They are very interested in hearing your advice for new teachers, how to find a good job and how to be an effective and sane teacher of adolescents. If you are a secondary teacher of mathematics, computing, statistics or physics and would like to reserve a place, please email Dr. Hare (ahare@messiah.edu) by Nov. 10. The dinner will be held from 6-7 p.m. It is free, and the conversation is friendly and helpful.

School of Science, Engineering and Health 12th Annual Symposium

Friday, May 1, 2015

Relatively recent alumni are familiar with MEB Student Scholars' Expo (formerly MEB Scholarship Day) through attendance and participation as students. However, most of you have not had the opportunity to experience one of these events. This event is now called School of Science, Engineering and Health Annual Symposium. If you live within driving distance of the College, we encourage you to visit this symposium which is always held on the last Friday of the spring term and features student (mostly) and faculty presentations. There is no registration fee and snack breaks are provided. For details including abstracts, check the SEH School website in spring 2015 (messiah.edu/SEH/symposium).

Request for Internship Opportunities

Does your employer hire interns in a mathematics-related area such as actuarial science, statistics or finance? Our mathematics majors often pursue minors in business, economics or statistics and are seeking internships in their third and fourth years. Please let the department know of such opportunities by emailing Dr. Wilcock (swilcock@messiah.edu). Even if you live far from Messiah, we may have a student from a nearby hometown interested in a summer internship.

MESSIAH COLLEGE

DEPARTMENT OF INFORMATION AND MATHEMATICAL SCIENCES

One College Avenue Suite 3041
Mechanicsburg PA 17055

Address Service Requested

ANALYTIC THREADS

Analytic Threads is the annual newsletter of the Department of Information and Mathematical Sciences (IMS) at Messiah College. It is sent annually to alumni and is also available electronically at the department's website, messiah.edu/departments/mathsci.

Parting Thoughts

We hope things are going well for you and your families. We enjoy receiving updates and having you visit us at Messiah. However, we will generally not publish your updates. Since your circle of connections at Messiah College was bigger than the Department of Information and Mathematical Sciences, we encourage you to send the updates that you want to be published to the Class Notes section of The Bridge, the College's magazine for alumni, parents and friends (messiah.edu/alumni/sendnews).

To update your email address, please email our administrative assistant Jean McCauslin (JMcCausl@messiah.edu).

Editor: Dr. Marlin Eby (Eby@messiah.edu)

Another Opportunity

Adjunct Teaching at Messiah

Are you or someone you know interested in teaching mathematics, computer science, information science or physics at Messiah College? Interested persons with at least a master's degree in a related field are encouraged to send their resume and application (messiah.edu/faculty/application) to Dr. Hare at One College Avenue, Suite 3041, Mechanicsburg PA 17055-6807. The department often needs part-time adjunct instructors to teach general education courses, and we welcome applications from alumni and their friends and family.

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Annual newsletter of the Department of Computer and Information Science
and the Department of Mathematics, Physics and Statistics

MESSIAH COLLEGE

ANALYTIC THREADS

FALL 2015

News from the department faculty

Marlin Eby

On July 19, 2014, Dr. Marlin Eby and his wife Julie welcomed a son into their family when Andrew Todd married their daughter Heather. They gained another daughter when Wendy Fureman married their son Matthew on Jan. 30, 2015.

Matthew Farrar

Congratulations to Dr. Matthew Farrar (incoming Physics professor) and Dr. Emily Farrar (incoming engineering professor) on the birth of their first child, Clara Rose, on Feb. 11, 2015.

Dr. Farrar published the following paper this past year: Farrar, M., Rubin, J., Diago, D., and Schaffer, C. (2015), "Characterization of Blood Flow in the Mouse Dorsal Spinal Venous System Before and After Dorsal Spinal Vein Occlusion," Journal of Cerebral Blood Flow & Metabolism, 35 (4), 667-675.

Angela Hare

On Feb. 13, 2015, Dr. Angela Hare became Interim Dean of the School of Science, Engineering and Health (SEH). She will serve in this position through the 2015-2016 school year. She replaced Dr. Ray Norman who stepped down to become director for faith leadership in water, sanitation and hygiene for World Vision International.

In January 2016, Dr. Hare will lead a Collaboratory team of four students, including Mathematics-with-Certification seniors Rebekah Curtis, Victoria Dix and Jessica Martin to Burkina Faso to work on the Yako Education Project. See details on this project in the Collaboratory news section.

Robert Kilmer

Dr. Bob Kilmer attended the International Conference on Computing and Missions in Warrenton, Missouri from June 16-20, 2014. He presented "Enhancing an Online Quantitative Research Course through Increased Interaction among Faculty and Students" at the 44th Annual Conference of the International Society for Exploring Teaching and Learning held in Denver, Colorado from Oct. 16-18, 2014.

Dr. Kilmer traveled to Montrouis, Haiti from March 14-22, 2015 with Life Connection Missions. There he taught 14 Haitian business administration students in classes of operations management, decision making and descriptive statistics. (See the photo on page 5.)

Abaz Kryemadhi

Congratulations to Dr. Abaz Kryemadhi on his promotion to associate professor of physics.

Dr. Kryemadhi published two papers this past year: Kryemadhi, A. and Chrestay, K. (Physics '14) (2015), "Gamma Ray Spectroscopy with a Silicon Photomultiplier and a LYSO Crystal," American Journal of Physics, 83 (4), 378 and Bakunov, M., Maslov, A., Novokovskaya, A., and Kryemadhi, A. (2015), "The No-Reflection Regime of Radar Detection of Cosmic Ray Air Showers," New Journal of Physics, 17 (5), 053015. He presented "Development of a Neutron Veto Prototype for SuperCDMS SNOLAB Experiment" at the Annual Meeting of American Physical Society held in Baltimore from April 11-14, 2015.

Philosophy professor Dr. Robin Collins, with Dr. Kryemadhi as co-investigator, received a $54,000 grant from the John Templeton Foundation Providence and Chance initiative to work on the project "Discoverability and Providence." A major part of this project seeks to quantitatively determine the degree to which the values of the fundamental parameters of physics are optimal for scientific discovery. The results are that they appear extraordinarily fine-tuned for this purpose.

Brian Nejmeh

Professor Brian Nejmeh and Dr. Vince LaFrance (management and business) led a January 2015 cross-cultural trip to Costa Rica.

Professor Nejmeh was involved in two Collaboratory projects. He continued to work with students in CIS 412 (Systems Analysis and Design Applications) on the Intelligent Water Project, improving mobile app functionality, adding an alert feature and improving project documentation. He also formed a new partnership with Cure International to incorporate a ministry module for a medical records system.

Faculty news, continued on page 2

David Owen

Congratulations to Dr. David Owen and his wife Gretta on the birth of their daughter, Eva Hope, on Sept. 11, 2014. She joins brothers Gareth (6) and Eliot (2).

Dr. Owen is continuing work on a project integrating the universal document converter Pandoc (pandoc.org), the generic syntax highlighter Pygments (pygments.org), and the learning management system Canvas (canvaslms.com).

Douglas Phillippy

On Aug. 2, 2014, Dr. Doug Phillippy and his wife Deb welcomed a son into their family when Taylor Kincer (Mathematics-with-Certification '14) married their daughter Lauren.

Dr. Phillippy published the following paper this past year: Phillippy, D. (2015), "A Pranalogical Approach to Faith-Integration with Students," Perspectives on Science and Christian Faith, 67 (2), 89-99. He presented "Preparing Students to Read a Calculus Textbook" at the 20th Biennial Conference of the Association of Christians in the Mathematical Sciences held at Redeemer University College in Ancaster, Ontario from May 27-30, 2015.

This past year, Dr. Phillippy began to serve as a Collaboratory advisor for the Biodiesel Project team spending most of the year getting up to speed on the goals and objectives of the team.

Christine Robinson

Dr. Christine Robinson was competitively selected for participation in the Park City Math Institute, sponsored by the Institute of Advanced Studies in Princeton, New Jersey. She spent three weeks in July 2015 in Salt Lake City, Utah studying and researching the geometry of moduli spaces and representation theory.

Scott Weaver

Dr. Scott Weaver co-authored the following paper this past year with Professor Nejmeh: Nejmeh, B. and Weaver, D. S. (October 22-25, 2014), "Leveraging SCRUM Principles in Collaborative, Interdisciplinary Service-Learning Project Courses," Frontiers in Education Conference (FIE) – 2014 IEEE (Institute of Electrical and Electronics Engineers), 1-6.

Lamarr Widmer

Dr. Lamarr Widmer continued his Collaboratory work and traveled to Ghana, West Africa from July 12-26 as part of an Africa WASH (Water, Sanitation, and Hygiene) and Disabilities Project team.

Samuel Wilcock

Congratulations to Dr. Sam Wilcock and his wife Joy on the birth of their daughter Prisca Jane on May 26, 2015. She joins sisters Abigail (9) and Naomi (7) and brothers Jaden (8) and Solomon (3).

Dr. Wilcock published the following chapter this past year: Wilcock, S. (2014), "Leaving Christendom to Follow Christ," in A Living Alternative: Anabaptist Christianity in a Post-Christendom World, edited by A. Green and J. Harader, Garden City, NY: Ettelloc. He presented "Student Projects in the Age of IRBs (Institutional Review Board) at the Joint Statistical Meetings held in Boston from Aug. 2-7, 2014.

Dr. Wilcock was a judge for Moody's Mega Math (M3) Challenge – 2014 and 2015. This is a mathematical modeling contest for teams of high school students organized by the Society for Industrial and Applied Mathematics (SIAM) and sponsored by The Moody's Foundation.

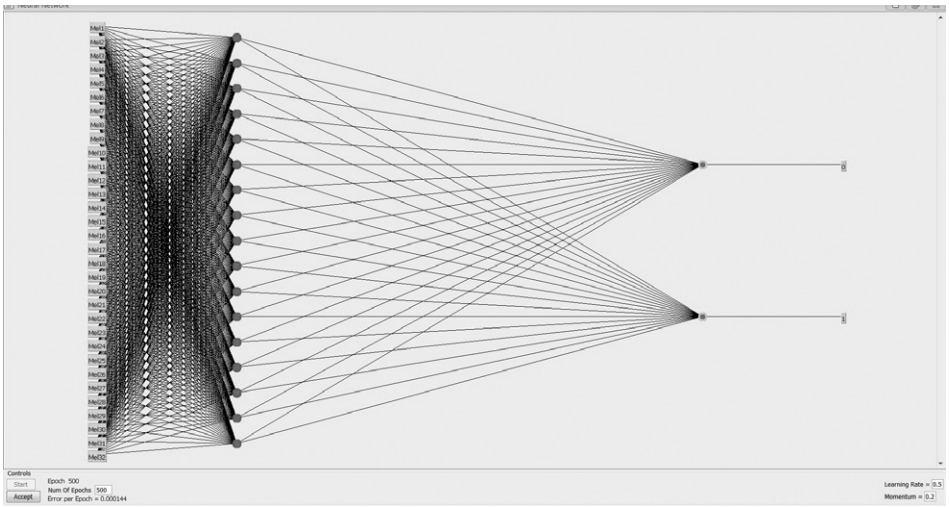
Retired Faculty News

Gene Chase

Dr. Gene Chase published the following review this past year: Chase, G. (2015), "Review of The Glass Cage: Automation and Us, N. Carr," in Perspectives of Science and Christian Faith, 67 (1), 70-71. He presented "Science and Faith" at the monthly meeting of Reason to Believe – Lancaster Chapter held in Bird-in-Hand, PA on Dec. 9, 2014.

This past year, Dr. Chase advised the WERCware (Wearable Enabled Remote Co-presence) Project team in the Collaboratory on the use of artificial neural networks. See the 2014 issue of Analytic Threads for more details about WERCware.

BELOW: An artificial neural network can be trained to recognize when a client is stressed or unstressed by voice, by galvanic skin response, or by a combination of the two.



Welcome

Matthew Farrar

In fall 2015, Dr. Matt Farrar will join the Department of Mathematics, Physics and Statistics as assistant professor of physics. He comes to Messiah from his position as postdoctoral associate in the Department of Neurobiology and Behavior at Cornell University. During the past year, he published an article on blood flow patterns in the spinal cord, which may provide insights into mechanisms of spinal cord injury and chronic problems such as spinal stenosis (the narrowing of the spinal column). He is currently in the writing phase of work on the topology of the noradrenergic system of the brain, a key player in mental health issues including depression and anxiety. The tail end of this project also involved the construction of a laser sheet microscope capable of imaging the entire zebrafish brain with cellular-level resolution in approximately one second.

Dr. Farrar was awarded his M.S. and Ph.D. in physics at Cornell University in 2010 and 2012. He received his B.Sc. in physics from McMaster University in Hamilton, Ontario in 2007. He is a native of Hamilton.

Dr. Farrar's wife Emily will be joining Messiah's Department of Engineering in fall 2015 as assistant professor of biomedical engineering. They and their daughter Clara live in Upper Allen Township (Mechanicsburg).

Cynthia Lehman

Professor Cindy Lehman will also join the Department of Mathematics, Physics and Statistics in fall 2015 as lecturer of mathematics. Prior to this appointment, she was a mathematics and computer teacher at Harrisburg Christian School for six years and then an adjunct instructor for 11 years in computer and information science at Messiah College. Cindy is a mathematics-with-certification graduate of Messiah. She earned her M.A. in curriculum & instruction- educational technology at Loyola University Maryland. Her husband, Conrad, is a Messiah computer science alumnus and a lead software engineer at Highmark Blue Shield in Camp Hill. Cindy, Conrad, and their two children – Kyle (15) and Kara (13) – live in Hampden Township (Mechanicsburg).

Student News

Honors

Chua

Phoebe Chua '16 (mathematics) was invited to present a poster at the Emory University – Laney Graduate School STEM Research and Career Symposium in Atlanta from March 25-27, 2015. However, because of insufficient funds, she was unable to accept this invitation.

Cohen

Christa Cohen '15 (physics-with-certification) was awarded a full Library Research Grant, in the amount of $750, to support her proposal "A Cumulative Design of Effective Science Curriculum Strategies and Resources for Students in Sofia, Bulgaria." Christa traveled to Bulgaria over spring break 2015. Her library research surveyed the Petko Slaveikov Private Secondary School Library and the National Library of Bulgaria in Sofia to document the availability and accessibility of science materials at the secondary level. This project also led to her graduation with departmental honors in physics. Dr. Hare was her faculty reference.

Ely

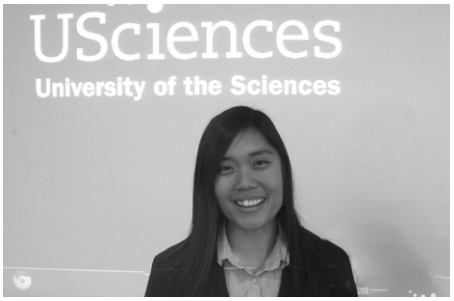
Rebecca Ely '16 (mathematics-with-certification) was selected as the MAC (Middle Atlantic Conference) Scholar-Athlete in Field Hockey. It was announced at the 14th Annual MAC Awards Luncheon held at Hood College in Frederick, Maryland on May 5, 2015. She also was named the Messiah College Female Senior Scholar-Athlete for 2014-2015. Becky finished her career with a 3.80 cumulative grade point average and was a two-time All-Region and three-time All-Commonwealth field hockey player. She also played lacrosse. In June 2015, Becky was nominated for the 2015 NCAA Woman of the Year Award. The award, now in its 25th year, recognizes the female student-athlete who best excels holistically in these four areas: academics, athletics, service and leadership. The award will be announced at the NCAA ceremony in October 2015.

Singley

Tiffani Singley '16 (computer and information science) was awarded the Crystal Meck Evans Scholarship for 2015-2016. This $1,100 award is given annually to a female student majoring in one of our CIS fields. Tiffani's academic strength, service to the department and commitment to a career in computer science made her an outstanding candidate.

From Left to Right: Marcus Upton, Nathan Chaney and Zachary Felix take their seats for the World Programming Competition in Morocco.

The Falcons I programming team – Nathan Chaney '15 (computer and information science and engineering), **Zachary Felix '15** (mathematics) and **Marcus Upton '15** (engineering) – placed first in the Mid-Atlantic Region Programming Contest of the Association for Computing Machinery (ACM) held Nov. 1, 2014. The contest was five hours of intense programming in Java or C++ as the team attempted solving as many of the problem scenarios as possible. Falcons I solved more problems correctly than any of the more than 150 teams, including teams from University of Maryland, Virginia Tech, University of Virginia and University of North Carolina. As a result, this team was one of only 23 teams from the U.S. to go to the World Finals in Marrakesh, Morocco in May 2015. Other U.S. schools sending teams included Carnegie Mellon, Cornell, Georgia Tech, Harvard, MIT, Stanford, UC – Berkeley and UCLA. The team was coached by Dr. Scott Weaver and Jason Long (Computer Science '03).



Presentations

Phoebe Chua '16 (mathematics) presented "Classifying Intersections of Max-Plus Hemispaces" at the fall 2014 MAA-EPADEL meeting held at the University of the Sciences in Philadelphia on Oct. 25, 2014. The presented research work was done in collaboration with Noah Kahrs (University of Chicago) and Yinuo Zhang (University of Rochester) at the 2014 Pennsylvania State University Mathematics REU under the supervision of Dr. Viorel Nitica (West Chester University).

Summer Activities: Discipline-Related


Chua

Phoebe Chua '16 (mathematics) participated in a REU (Research Experience for Undergraduates) in computer science and engineering at Washington University in St. Louis. She worked on the project "Strategies for Spontaneous Teamwork."


Cohen

Christa Cohen '15 (physics-with-certification) spent summer 2014 and summer 2015 at Stanford University as a teaching assistant for a young students' (5th and 6th grade) course in science and engineering. This course was offered through the Johns Hopkins Center for Talented Youth – Stanford site.


Ratzlaff

Lucas Ratzlaff '16 (mathematics) was part of a team working on a project in data analytics with a statistics professor at Vassar College in Poughkeepsie, NY.


Schrock

Katrina Schrock '16 (physics) had an internship with the Cardiac Rhythm and Heart Failure Group at Medtronic – Mounds View Campus in Minneapolis, Minnesota. She worked with a team looking into optical sensors, as an alternative to an external machine, for use in finding blood oxygen levels from inside the patient.

Class of 2015: Employment and Education Placements (to date)


Benning

- **Keith Benning** (computer and information science—software development concentration): Lockheed Martin in Baltimore, Maryland—software developer


Budd

- **Andrew Budd** (computer and information science—software development concentration): vCalc in Frederick, Maryland—software engineer


Chaney

- **Nathan Chaney** (computer and information science—computer science concentration, engineering—computer engineering concentration): IBM in Austin, Texas—software engineer


Cohen

- **Christa Cohen** (physics-with-certification): Episcopal Service Corps in Harrisburg, Pennsylvania


Crawley

- **James Crawley** (physics; computer science minor): Messiah College—laboratory assistant


Diehl

- **Jeremy Diehl** (computer and information science—business information systems concentration): Office of Consumer Advocate for the Office of Attorney General—IT system administrator


Ely

- **Rebecca Ely** (mathematics-with-certification; statistics minor): Westminster High School in Westminster, Maryland—mathematics reacher


Jones

- **Peter Jones** (computer and information science—software development concentration): Clark Associates in Lititz, Pennsylvania


Maze

- **Brandon Maze** (computer and information science—computer science concentration): Computer Aid, Inc. in Harrisburg, Pennsylvania—junior software developer


Moyer

- **Travis Moyer** (mathematics-with-certification): Northern High School in Dillsburg, Pennsylvania—mathematics teacher


Nase

- **Stephen Nase** (computer and information science—business information systems concentration): Textron in Providence, Rhode Island


Powell

- **Connor Powell** (computer and information science—software development concentration, philosophy minor): ImageVision.Net in Mechanicsburg, Pennsylvania—software developer


Shuck

- **Peter Shuck** (computer and information science—computer science concentration, mathematics; economics minor): Akumina Inc. in Nashua, New Hampshire—software engineer


Smith

- **Rebekah Smith** (computer and information science—computer science concentration): Cure International in Lemoyne, Pennsylvania—IT fellow


Toote

- **Celtson Toote** (computer and information science—web management concentration): LifeWay Christian Resources in Nashville, Tennessee—junior UI/UX developer/designer


Van Ness

- **Sarah Van Ness** (mathematics, biology): Biostatistics (Ph.D.)—Boston University

LEFT: Physics students Tyler McManiman and Rachel Sulonen engaging Downey Elementary School students in a hands-on science activity. RIGHT: Some of Dr. Kilmer's students in Haiti waiting by the sea for class to begin.

Department News

On July 1, 2015, the Department of Information and Mathematical Sciences was officially divided into two new departments: the Department of Computer and Information Science and the Department of Mathematics, Physics and Statistics. Functionally, the division occurred in January 2015, but for budgetary reasons, the division could not become official until the start of the new fiscal year. We are confident that this new structure will facilitate stronger programs and communication.

Computer and Information Science

The CIS Department houses two majors: computer and information science (four concentrations) and digital media (one concentration). It also houses two minors: business information systems and computer science. Full-time faculty members are Dr. Kilmer, Prof. Nejmeh, Dr. Owen, Dr. Rohrbaugh (chair) and Dr. Weaver.

The CIS Department hosted Coder Kids on campus on March 21, 2015. Coder Kids aims to "… encourage kids to develop their interests in all areas of STEM (Science, Technology, Engineering and Mathematics) through mentoring and hands-on learning with cool projects, interesting demos, and fascinating presentations by other kids and local professionals." We had 74 guests in attendance (about 40 students) for a two-hour programming lesson.

The department revised both minors (business information systems and computer science) to update and strengthen them.

Fall 2015 enrollment projections for CIS are strong. As of March 30, CIS had the largest year-over-year increase in applications and acceptances of any department at Messiah with 68 applications (up from 34) and 53 acceptances (up from 25). Currently there are 29 CIS majors and 16 digital media majors enrolled in the fall 2015 sections of introduction to computer and information science.

Support opportunities

Your continuing support of Messiah College in all ways is greatly appreciated.

With respect to financial support, some of you may wish to target donations to specific projects related to your Department. Of course, your gift is doubled when your employer has a matching gift program. Consider a gift to the College that is earmarked as described below. Send your tax-deductible gift – check made payable to Messiah College – to Office of Development, One College Avenue, Suite 3013, Mechanicsburg, PA 17055-6807.

- To make a donation to the Department of Mathematics, Physics and Statistics, put MPS Dept. on the memo line of your check.
- To make a donation to the Department of Computer and Information Science, put CIS Dept. on the memo line of your check.
- To support Collaboratory Education Group projects, put Collab. Education Group – project name on the memo line of your check.
    - Add *YEP* for the Yako Education Project.
    - Add *OBED* for the Opportunities in Business and Educational Development Project.
    - Add *SCPH* for the Harrisburg Science Camps Project.
- The SEH School has an enrichment fund that is used to fund student travel to out-of-state academic conferences to present their work. This fund rolls over year to year, so it is a great place for one-time gifts. Donors should specify SEH School – Enrichment Fund.
- If you are interested in contributing to a scholarship for students in the MPS or CIS Departments, contact the Office of Development. It takes $25,000 to underwrite (seed) a scholarship.
- If you are interested in contributing to an endowed scholarship chair for faculty members in the MPS or CIS Departments, contact the Office of Development. It takes $2 million to underwrite an endowed scholarship chair.

Mathematics, Physics and Statistics

The MPS department houses five majors: mathematics, mathematics-with-certification, physics (B.A.), physics (B.S.), and physics-with-certification. It also houses three minors: mathematics, physics and statistics. Full-time faculty members are Dr. Eby, Dr. Farrar, Dr. Hare, Dr. Hellgren, Dr. Kryemadhi, Prof. Lehman, Dr. Phillippy, Dr. Robinson, Dr. Widmer and Dr. Wilcock (chair).

Collaboratory - Yako Education Project in Burkina Faso, West Africa

Program News

Physics

Christa Cohen graduated in May 2015 as Messiah's first physics-with-certification major.

Drs. Hellgren and Kryemadhi and nine physics students attended the 1st Annual Meeting of the Mid-Atlantic Section of the American Physics Society (MAS- APS) at The Pennsylvania State University on Oct. 3-5, 2014.

Messiah College hosted the 63rd Annual Conference of the American Association of Physics Teachers – Central Pennsylvania Section (AAPT-CPS) on March 27-28, 2015. Approximately 50 high school teachers, college professors and students attended.

A group of the Ruth Education Centre students after their English class.

Nine physics students who attended the Ist Annual Meeting of the Mid-Atlantic Section of the American Physics Society (MAS- APS) at The Pennsylvania State University on Oct. 3-5, 2014.

Collaboratory News

Faculty and students from both the CIS and MPS departments have been heavily involved in projects within the Collaboratory for Strategic Partnerships and Applied Research (messiah.edu/collaboratory/).

The Collaboratory Education Group has two current projects led by students from the MPS department. Rebekah Curtis (mathematics-with-certification '16) leads the Yako Education Project working in partnership with Burkina Faso Outreach (www.bfoafrica.org). The project aims to produce mathematics materials that incorporate Bible stories with images and artwork done by the schoolchildren. Bekah was a Smith Scholar intern in 2014-2015. Working with Dr. Hare, she led a team of five students in the design and writing of a mathematics curriculum for children at the 4th grade level in Burkina Faso, West Africa. The lessons, in the French language, are culturally appropriate (written with a context familiar to the local community), satisfy the Burkinabè national educational standards, and include the integration of scripture.

Phoebe Chua '16 (mathematics) leads the Opportunities in Business and Educational Development Project working in partnership with the Ruth Education Center in Malaysia. The goal of this project is to develop curriculum to improve the business acumen of

Myanmar refugees in Malaysia so that they can obtain legal employment.

Dr. Kryemadhi and Professor Ariela Vader advise the Collaboratory Education Group's Harrisburg Science Camps Project. This project provides science enrichment for underserved students in the Harrisburg School District. Physics-with-certification and education majors delivered several science camps in Downey School and Camp Curtin Academy in Harrisburg. This project is funded by the Whitaker Fund for Math and Science Education.

Future Events

MPS department and CIS department Homecoming Receptions – Saturday, Oct. 17, 2015

Both the MPS department and CIS department will be hosting informal receptions for all respective department alumni at Homecoming 2015. Watch your mail/email for details.

Homecoming "+/- 3 Breakfast" – Saturday, Oct. 17, 2015

All 2013, 2014 and 2015 IMS (i.e., MPS and CIS) Department graduates are invited to brunch at Brothers Diner from 9-11 a.m. on Homecoming Saturday. Department students in their 2nd, 3rd and 4th years will also be invited. Email our administrative assistant, Jean McCauslin (JMcCausl@messiah.edu) before Oct. 14 if you would like to attend.

Alumni Mathematics Teacher Dinner – Monday, Nov. 16, 2015

Each fall, our MATH 407 (Professional Issues in Secondary Mathematics Education) class of current student teachers invites alumni who are middle or high school mathematics teachers to join them for dinner. They are very interested in hearing your advice for new teachers, how to find a good job, and how to be an effective and sane teacher of adolescents. If you are a secondary mathematics teacher and would like to reserve a place, please email Dr. Wilcock (swilcock@messiah.edu) by Nov. 9. The dinner will be held from 6-7 p.m. It is free, and the conversation is friendly and helpful.

School of Science, Engineering and Health 13th Annual Symposium – Friday, April 29, 2016

Relatively recent alumni are familiar with MEB Student Scholars' Expo (formerly MEB Scholarship Day) through attendance and participation as students. However, most of you have not had the opportunity to experience one of these events. This event is now called School of Science, Engineering and Health Annual Symposium. If you live within driving distance of the College, we encourage you to visit this symposium which is always held on the last Friday of the spring term and features student (mostly) and faculty presentations. There is no registration fee and snack breaks are provided. For details including abstracts, check the SEH School website in spring 2016 (messiah.edu/SEH).

Request for Internship Opportunities

Does your employer hire interns in a mathematics-related area such as actuarial science, statistics or finance? Our mathematics majors often pursue minors in business, economics or statistics and are seeking internships in their third and fourth years. Please let the MPS department know of such opportunities by emailing Dr. Wilcock (swilcock@messiah.edu). Even if you live far from Messiah, we may have a student from a nearby hometown interested in a summer internship.

New Address Reminder

Messiah College's mail-receiving post office changed from Grantham to Mechanicsburg. As a result, the address for all Messiah faculty members is as follows:

Name of faculty member
One College Avenue, Suite #
Mechanicsburg, PA 17055-6807

- *Suite # for MPS: 3041*
- *Suite # for CIS: 3046*

MESSIAH COLLEGE

DEPARTMENT OF MATHEMATICS, PHYSICS AND STATISTICS

One College Avenue Suite 3041
Mechanicsburg PA 17055

Address Service Requested

ANALYTIC THREADS

Analytic Threads is the annual newsletter of the Department of Computer and Information Science (CIS) and the Department of Mathematics, Physics and Statistics (MPS) at Messiah College. It is sent annually to alumni and is also available electronically at the websites **messiah.edu/CIS** and **messiah.edu/MPS**.

Parting Thoughts

We hope that all is well with you and your families. We enjoy receiving updates and having you visit us at Messiah. However, we will generally not publish your updates. Since your circle of connections at Messiah College was bigger than the MPS and CIS Departments, we encourage you to send the updates that you want to be published to the Class Notes section of The Bridge, the College's magazine for alumni, parents and friends (messiah.edu/alumni/sendnews).

To update your email address, please contact our administrative assistant, Jean McCauslin at jmccausl@messiah.edu.

Editor: Dr. Marlin Eby (Eby@messiah.edu)

15_1702

Opportunities for Adjunct Teaching at Messiah

Are you or someone you know interested in teaching Mathematics, Computer Science, Information Science or Physics at Messiah College? Interested persons with at least a master's degree in a related field are encouraged to send their resume and statement of interest to Dr. Wilcock (MPS) or Dr. Rohrbaugh (CIS) at One College Avenue, Suite (3041 for MPS or 3046 for CIS), Mechanicsburg, PA 17055-6807. The MPS and CIS departments often need part-time adjunct instructors to teach general education courses, and we welcome applications from alumni and their friends and family.

MESSIAH COLLEGE

Annual newsletter of the Department of Mathematics, Physics and Statistics

ANALYTIC THREADS

FALL 2016

News from the department faculty

Matthew Farrar

Drs. Emily (engineering) and Matthew Farrar mentored two Steinbrecher Undergraduate Summer 2016 Research Fellowship recipients, Brianne Roper and Daniel Haas, on the Collaboratory Diagnostics of Viral Disease (DVD) project. Their particular project is entitled Diagnostic Protein Probe for HIV Detection. The DVD project aims to use dynamic light scattering and a novel molecular probe to diagnose HIV at point of care in the developing world.

Angela Hare

After a national search, Dr. Angela Hare was chosen as dean of the School of Science, Engineering and Health, effective March 17, 2016. Congratulations! She had served as interim dean since Feb. 13, 2015. Dr. Hare joined the Messiah College community in 1996 and had served as professor of mathematics, chair of the Department of Information and Mathematical Sciences and interim dean. In announcing Dr. Hare's appointment, Provost Randall Basinger said, "I am very pleased with Dr. Hare's acceptance to continue in this capacity on a permanent basis. She is well positioned to provide ongoing leadership to the School and the College." She will also retain her academic appointment in the Department of Mathematics, Physics and Statistics.

Under Dr. Hare's direction, mathematics-with-certification majors Victoria Dix, Jessica Martin and Rebekah Curtis Shoemaker, and Emily Smetak (mathematics '17) completed a mathematics primer in the French language for children in the middle-level grades in Burkina Faso, West Africa. This primer was designed to help these children prepare for a national middle school entrance exam. The students worked with Dr. Hare for three semesters to draft this resource for their partner organization, Burkina Faso Outreach, and traveled to the village of Yako in Burkina Faso for two weeks in January 2016 to receive input from local teachers before completing the resource in spring 2016.

Clockwise from top left: Burkina Faso Outreach teacher with two mathematics students. Emily Smetak directing a craft activity. Victoria Dix distributing bracelets at a Burkina Faso Outreach party. Emily Smetak, Jessica Martin, Victoria Dix and Rebekah Curtis Shoemaker at an artisan village in Ouaga. Rebekah Curtis Shoemaker with a canine friend in Yako.

In fall 2015, Dr. Hare taught MATH 490 – Graph Theory. This is an uncataloged course with a co/prerequisite of MATH 261 – Linear Algebra.

In May 2016, Dr. Hare traveled with Drs. Randall Fish (engineering) and Scott Weaver (computer and information science) to Seoul, South Korea to explore a potential study-abroad partnership with Korea University through the Veritas Christian Study Abroad Program.

Faculty news, continued on page 2

Twenty-four Messiah students (including two from MPS) in front of a Norwegian stave church on the Scandinavia cross-cultural course, led by Dr. Hellgren and Dr. Noble.

Niklas Hellgren

Congratulations to Dr. Niklas Hellgren on his promotion to associate professor of physics!

Dr. Hellgren presented at two professional conferences this year: "In situ XPS Analysis of CNx Thin Films" at the 62nd International Symposium of the American Vacuum Society (AVS) in San Jose, California on Oct. 19-23, 2015 and "Exploratory Physics – A New Introductory Physics Course at Messiah College" at the Central Pennsylvania Section of the American Association of Physics Teachers (AAPT-CPS) at Moravian College on April 8-9, 2016.

In May 2016, Dr. Hellgren and Dr. Alison Noble (Chemistry & Biochemistry) led 24 students on a cross-cultural trip to Iceland, Sweden and Norway.

Abaz Kryemadhi

On Feb. 2, 2016, Dr. Kryemadhi presented an invited talk, "Implementation of CERN-Based Data Monitoring System," at the University of Maryland. The invitation was extended by the ISS-CREAM Collaboration (International Space Station – Cosmic Ray Energetics and Mass), a collaboration of physicists planning to send a high energy cosmic ray detector into space. CERN is the European Organization for Nuclear Research. (Editor's note: Yes, "ISS-CREAM" is pronounced "ice cream.")

On March 7, 2016, Dr. Kryemadhi returned to the University of Maryland to give an invited talk to the physics department, "Study of Silicon Photomultipliers Coupled to LYSO Crystals as Compact Photon Detectors."

Dr. Kryemadhi attended the American Physical Society Meeting on April 16-19, 2016 in Salt Lake City and presented "Study the Performance of LYSO and CeBr3 Crystals Using Silicon Photomultipliers."

Dr. Kryemadhi was awarded a $9,036 NASA Pennsylvania Space Grant Consortium. The grant, Compact Detectors for Cosmic Rays and Dark Matter Searches in Space, will involve five students – Lindsey Barner, Andrew Grove (physics '18), Jacob Mohler (physics '18), Caleb Sisson (physics, engineering '18), and Alexander Roth (engineering; physics minor '17) – in research and development.

Dr. Kryemadhi and Dr. Robin Collins (philosophy) received a $54,000 grant for 2016-2018 from the John Templeton Foundation Providence and Chance initiative to work on the project Discoverability and Providence. Of this grant, $34,000 is allocated to Dr. Kryemadhi's work on discoverability in particle physics.

In 2016-2017, Dr. Kryemadhi will serve as President of American Association of Physics Teachers – Central Pennsylvania.

Cynthia Lehman

With the appointment of Dr. Hare as SEH dean, a mathematician vacancy was created in the MPS department. The department was granted permission by Provost Basinger to immediately begin a national search for her replacement. The department had to look no further than its own midst. Cindy Lehman (mathematics-with-certification '94) who served the department as lecturer in mathematics in 2015-2016 accepted the College's offer of a continuing position as senior lecturer in mathematics beginning in 2016-2017. Dean Hare is very pleased with the hire and believes that the department's choice to hire someone who can provide attention and oversight to the QuEST (General Education) courses is a good and strategic one. On the other hand, Dr. Hare noted how quickly the department had replaced her. For more information about Professor Lehman, see Analytic Threads – fall 2015.

Douglas Phillippy

In May 2016, Dr. Phillippy accompanied a Collaboratory team to Panama to build a pedestrian bridge across a river. Among other things, this new bridge will allow children to cross the river on the way to school when rain would make fording the river dangerous. Dr. Phillippy was a last-minute replacement for tech. Andrew Erikson (engineering) whose father, Professor Emeritus Carl Erikson, was terminally ill. For news of Professor Erikson's passing, see the In Memory section.

Christine Robinson

Dr. Christine Robinson was competitively selected for participation in the Park City Mathematics Institute Summer Undergraduate Faculty Program. This program was sponsored by the Institute of Advanced Studies in Princeton, New Jersey. She spent three weeks in July 2015 in Salt Lake City studying and researching the geometry of moduli spaces and representation theory and participating in discussions of pedagogy and practice. This program ran concurrently with programs for research faculty, graduate students, undergraduate students and secondary school teachers.

Dr. Robinson gave a talk entitled, "First Impressions: Using a Reciprocal Interview Activity to Set the Tone for the Semester," at the STEM-UP PA Innovations in Teaching Symposium held at Dixon University Center in Harrisburg on Dec. 5, 2015.

In June 2016, Dr. Robinson was a first-time participant in the Calculus AP Reading held in Kansas City, MO.

Lamarr Widmer

Dr. Widmer, a member of the organizing committee and a session moderator, attended the Second MOVES (Mathematics of Various Entertaining Subjects) Conference held at the National Museum of Mathematics in New York on Aug. 2-4, 2015. He had been one of two co-editors of the Journal of Recreational Mathematics for many years.

After traveling to Ghana in July 2015, Dr. Widmer also traveled there twice in 2016 (January and June) as part of the Collaboratory Africa WASH (Water, Sanitation, and Hygiene) and Disability Study Team. This team continues its work with disability awareness and accommodations for access to sanitary facilities and water sources for people with disabilities.

Faculty news, continued on page 3

Samuel Wilcock

Congratulations to Dr. Wilcock on his promotion to professor of statistics!

Dr. Wilcock represented the ASA (American Statistical Association) Statistical Education Section on the Program Committee for the ENAR Spring Meeting held in Austin, Texas on March 6-9, 2016. ENAR is the Eastern North American Region of the International Biometric Society.

In June 2016, Dr. Wilcock was an eighth-time participant in the Statistics AP Reading held in Kansas City, Missouri. He joined several departmental alumni in that endeavor.

Retired Faculty News

Gene Chase

Dr. Chase continues as a Collaboratory consultant in the area of artificial neural networks (ANNs). The Wireless Enabled Remote Co-presence (WERCware) system enables a job coach to monitor multiple employees in order to provide emotional assistance. The ANN, once trained, automatically detects stress from voice modulation and electrodermal response so that the job coach can intervene. Government agencies see WERCware as helping those with post-traumatic stress disorder to hold jobs.

In Memory

Carl Erikson

In announcing Professor Emeritus Carl Erikson's (engineering) passing on May 29, 2016, Dean Angela Hare stated, "With sadness but rejoicing in a life lived for the Lord, I write to let you know that Carl died peacefully last night. Many of you know Carl well as a dedicated professor in engineering for many years and recent chair of that department. Carl's work for Messiah College was sacrificial, always thinking of and working for the good of the program, and he was a true Christian brother in Christ with us his colleagues." Since Professor Erikson occasionally taught a course in our department, some of you may remember him as one of your professors. His obituary may be viewed at messiah.edu/eriksonmemorial.

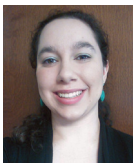
Student News

Honors

Brabazon

Chua

deNyse

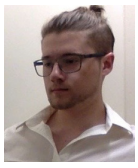


Schrock

- Congratulations to the department's top scorer on the physics major field test, **John Brabazon**!
- **Phoebe Chua '16** graduated with department honors in mathematics. Her thesis was entitled "Communication Strategies for Spontaneous Teamwork."
- Congratulations to the department's top scorer on the mathematics major field test, **Angela deNyse**!
- **Katrina Schrock** graduated with department honors in physics. Her project was entitled "Low Cost, High Speed Correlation for Dynamic Light Scattering on a Field Programmable Gate Array and Potential Applications in HIV Detection."

Beam

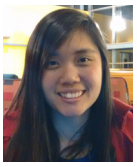
Ritenour



Saylor

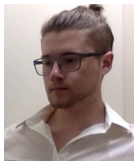
- **Christopher Beam** (computer and information science, mathematics), **Laura Ritenour** (molecular biology, mathematics), and **Dallas Saylor** (English, mathematics), graduated with department honors in their respective second majors.

Beam

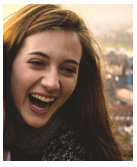


Chua

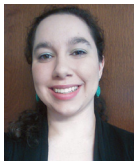
Ritenour



Saylor

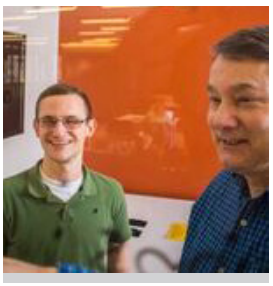


Schlogl



Schrock

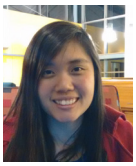
- Six MPS department graduates were members of the College Honors Program: **Christopher Beam**, **Phoebe Chua**, **Laura Ritenour**, **Dallas Saylor**, **Rachel Schlogl** and **Katrina Schrock**.



Dr. Eby and Nicholas Weaver discussing a theoretical statistical problem

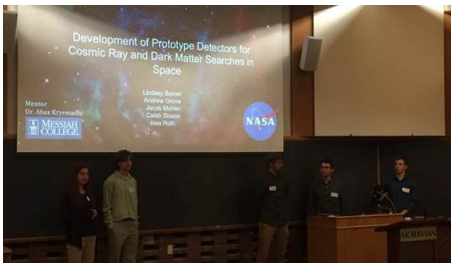
- **Nicholas Weaver** (mathematics '17) and Dr. Eby were the subject of a full-page feature in Lancaster Mennonite School Bridges – Winter 2016. This issue of the LMS community magazine focused on current teachers, students and alumni who are scientists, mathematicians or teachers of science and mathematics. LMS is a significant feeder school to Messiah College.

Presentations



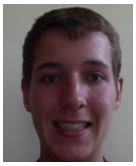
Chua

- **Phoebe Chua** read her reflection, "Stillness through the Seasons," at the 2016 Baccalaureate Service.
- **Lindsey Barner**, **Andrew Grove**, **Jacob Mohler**, **Caleb Sisson** and **Alexander Roth** presented "Development of Prototype Detectors for Cosmic Ray and Dark Matter Searches in Space" at the Central Pennsylvania Section of the American Association of Physics Teachers (AAPT-CPS) Spring Conference held at Moravian College on April 8-9, 2016.



Lindsey Barner, Jacob Mohler, Caleb Sisson, Andrew Grove, and Alexander Roth presenting research at the annual meeting of Central Pennsylvania Section of the American Association of Physics Teachers, at Moravian College.

Summer Activities: Discipline-Related



LaGrand

- **Jacob LaGrand** (mathematics, philosophy '18) was a teaching fellow (eighth grade mathematics) in the

Breakthrough Collaborative Teaching Residency Program held at the University of Texas, and local public and private middle schools, in Austin. To participate in Breakthrough, a student must be excelling within their public school district and an aspiring first-generation college student. For more on BCTRP, see www.breakthroughcollaborative.org.


Schwiker

- **Kelly Schwiker** (mathematics '17) participated in the 2016 PIMS-NSF Undergraduate Workshop on Supersymmetry held at the Pacific Institute for the Mathematical Sciences at the University of British Columbia.

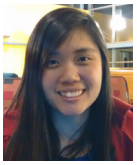
Class of 2016: Employment and Education Placements (to date)


Beam

- **Christopher Beam** (computer and information science, mathematics): Katapult Engineering in Dillsburg, Pennsylvania - Software Developer


Bressler

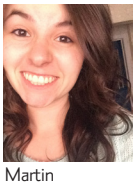
- **Matthew Bressler** (physics – B.S., mathematics): Physics - Particle Physics concentration (Ph.D.) at Drexel University


Chua

- **Phoebe Chua** (mathematics; statistics minor, computer science minor): Informatics (Ph.D.) at University of California – Irvine


DeNardo

- **Julia DeNardo** (studio art; mathematics minor): Peace Corp in Namibia (southwest Africa) - secondary and upper primary education mathematics teacher


Martin

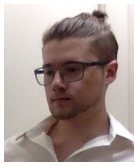
- **Jessica Martin** (mathematics-with-certification): Delaware Valley Charter High School in Philadelphia, Pennsylvania - Mathematics Teacher


Ratzlaff

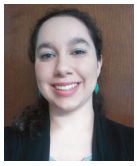
- **Lucas Ratzlaff** (mathematics; statistics minor): Walkway over the Hudson in Poughkeepsie, New York - Intern


Ritenour

- **Laura Ritenour** (molecular biology, mathematics; chemistry minor): cell and molecular biology - cancer biology concentration (Ph.D.) at University of Pennsylvania


Saylor

- **Dallas Saylor** (English - writing concentration, mathematics): Poetry (M.F.A.) at University of Houston


Schrock

- **Katrina Schrock** (physics – B.S.; computer science minor): physics - optics concentration (Ph.D.) at University of Iowa


Shoemaker

- **Rebekah Curtis Shoemaker** (mathematics-with-certification): Widefield High School in Colorado Springs, Colorado - Mathematics Teacher

Department News

The Department of Mathematics, Physics and Statistics houses five majors: mathematics, mathematics-with-certification, physics (B.A.), physics (B.S.), and physics-with-certification. It also houses three minors: mathematics, physics and statistics. Full-time faculty members are Dr. Eby, Dr. M. Farrar, Dr. Hare, Dr. Hellgren, Dr. Kryemadhi, Prof. Lehman, Dr. Phillippy, Dr. Robinson, Dr. Widmer and Dr. Wilcock (chair).

MPS Department graduates

Seventeen students graduated in December 2015 and May 2016 with majors in the MPS department. Three of these were double majors with a second major in another department, and one was a double major with both majors in our department. Here is the breakdown by major.

Mathematics: 8

Mathematics-with-Certification: 4

Physics (B.A.): 3

Physics (B.S.): 3

Physics-with-Certification: 0


Physics graduates: Katrina Schrock, Mike Joy, Grant Henry, Matt Bressler, Kyele Bridel and John Brabazon

Frey 367 serves as the MPS Lounge and Mathematics and Physics Help Room

MPS Lounge

During summer 2015, the department repurposed Frey 367 as the Mathematics, Physics and Statistics Resource Room, or the MPS Lounge, as it is more commonly known. (Several years ago, Frey 366 was partitioned into Frey 366 and Frey 367.) White boards on all walls, round tables, journals, textbooks and comfortable seating make this a wonderful collaborative workspace for our students, with easy access to faculty offices. The MPS Lounge also serves as our Mathematics and Physics Help Room, where, four nights a week, peer tutors provide extra help for students in our lower division courses. This space is becoming a department hub for students to exchange ideas, help each other, get excited about doing mathematics and physics outside of the classroom and build community.

Program News

Mathematics

During 2015-2016, the Math Club met weekly, focusing on problem-solving techniques and preparing for the Putnam Exam in the fall, with a more recreational emphasis in the spring. Activities included a Pizza and Problem-Solving Night, constructing Conway pencil models and exploring their symmetries, and a mathematical movie night. Dr. Robinson advises the club.

Physics

As seen in department news above, six students graduated with degrees in physics – the most ever.

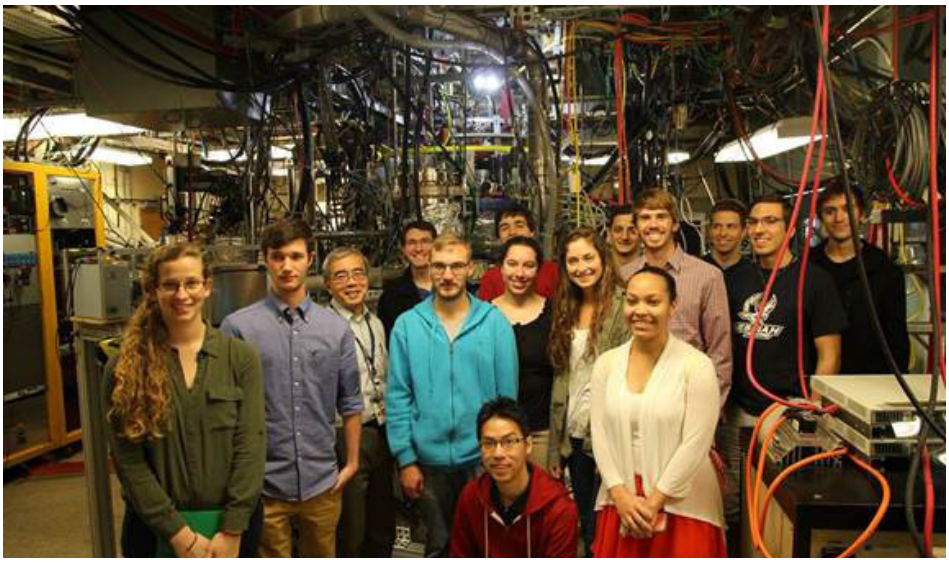
The Physics Club took two field trips in 2015-2016: Princeton Plasma Physics Laboratory in November and National Institute of Standards & Technology in January.

The Sigma Pi Sigma Physics Honors Society – Messiah Chapter was chartered in December 2015 with five inductees: John Brabazon, Matthew Bressler, Tyler McManiman (physics-with-certification '17), Alexander Roth and Katrina Schrock.

Collaboratory News

Faculty and students from the MPS department continue to be heavily involved in projects within the Collaboratory for Strategic Partnerships and Applied Research (messiah.edu/collaboratory). Details of these projects are given in faculty news and retired faculty news sections.

Math Club members construct Conway pencil models.



The Messiah College Physics Club on a field trip to the Princeton Plasma Physics Laboratory.

Sigma Pi Sigma Physics Honors Society – Messiah Chapter chartering ceremony, (front – left to right) inductees: Katrina Schrock, Alexander Roth, Matthew Bressler, John Brabazon and Tyler McManiman; (back – left to right) Faculty: Drs. Hellgren, Farrar, and Kryemadhi and representative from Sigma Pi Sigma national office, Sean Bentley.

Future Events

Monday, Nov. 14, 2016: Alumni Mathematics Teacher Dinner – Each fall, our MATH 407 (Professional Issues in Secondary Mathematics Education) class of current student teachers invites alumni who are middle or high school mathematics teachers to join them for dinner. They are very interested in hearing your advice for new teachers, how to find a good job, and how to be an effective and sane teacher of adolescents. If you are a secondary mathematics teacher and would like to reserve a place, please email Dr. Wilcock (swilcock@messiah.edu) by Nov. 9. The dinner will be held from 6-7 p.m. It is free, and the conversation is friendly and helpful.

Friday, April 28, 2017: School of Science, Engineering and Health 14th Annual Symposium – The MPS department's involvement in an event like this began as the School of Mathematics, Engineering and Business (MEB) Scholarship Day. It then became the MEB Student Scholars' Expo. With the formation of the School of Science, Engineering and Health, it became the School of Science, Engineering and Health Annual Symposium. If you live within driving distance of the College, we encourage you to visit this symposium which is always held on the last Friday of the spring term and features student (mostly) and faculty presentations. There is no registration fee and snack breaks are provided. For details including abstracts, check the SEH School website in spring 2017 (messiah.edu/sehsymposium).

Request for Internship Opportunities

Does your employer hire interns in a mathematics-related area such as actuarial science, statistics or finance? Our mathematics majors often pursue minors in business, economics or statistics and are seeking internships in their third and fourth years. Please inform the MPS department of such opportunities by emailing Dr. Wilcock (swilcock@messiah.edu). Even if you live far from Messiah, we may have a student from a nearby hometown interested in a summer internship.

Address reminder

Use the following address format to contact a faculty member by regular mail.

Name of faculty member
One College Avenue, Suite 3041
Mechanicsburg, PA 17055-6807

Support opportunities *Your continuing support of Messiah College in all ways is greatly appreciated.*

With respect to financial support, some of you may wish to target donations to specific projects related to your department. Of course, your gift is doubled when your employer has a matching gift program. Consider a gift to the College that is earmarked as described below. Send your tax-deductible gift – check made payable to Messiah College – to Office of Development, One College Avenue, Suite 3013, Mechanicsburg, PA 17055-6807.

- To make a donation to the Department of Mathematics, Physics and Statistics, put MPS dept. on the memo line of your check.
- To support the Collaboratory Diagnostics of Viral Disease project, put Collab. – DVD project on the memo line of your check.
- The SEH School has an enrichment fund that is used to fund student travel to out-of-state academic conferences to present their work. This fund rolls over year to year, so it is a great place for one-time gifts. Donors should specify SEH School – Enrichment Fund.
- If you are interested in contributing to a scholarship for students in the MPS Department, contact the Office of Development. It takes $25,000 to underwrite (seed) a scholarship.
- If you are interested in contributing to an endowed scholarship chair for faculty members in the MPS Department, contact the Office of Development. It takes $2 million to underwrite an endowed scholarship chair.

MESSIAH COLLEGE

DEPARTMENT OF MATHEMATICS, PHYSICS AND STATISTICS

One College Avenue Suite 3041
Mechanicsburg PA 17055

Address Service Requested

ANALYTIC THREADS

Analytic Threads is the annual newsletter of the Department of Mathematics, Physics, and Statistics (MPS) at Messiah College. It is sent annually to alumni and is also available electronically at the website **messiah.edu/MPS** .

Parting Thoughts

We hope that all is well with you and your families. We enjoy receiving updates and having you visit us at Messiah. However, we will generally not publish your updates. Since your circle of connections at Messiah College was bigger than the MPS department, we encourage you to send the updates that you want to be published to the Class Notes section of The Bridge, the College's magazine for alumni, parents and friends (messiah.edu/alumni/sendnews).

To update your email address, please contact our administrative assistant, Jean McCauslin, at jmccausl@messiah.edu.

Editor: Dr. Marlin Eby (Eby@messiah.edu)

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Opportunities for Adjunct Teaching at Messiah

Are you or someone you know interested in teaching mathematics or physics at Messiah College? Interested persons with at least a master's degree in a related field are encouraged to send their resume and statement of interest to Dr. Wilcock at One College Avenue, Suite 3041, Mechanicsburg, PA 17055-6807. The MPS department often needs part-time adjunct instructors to teach general education courses, and we welcome applications from alumni and their friends and family.

MESSIAH COLLEGE

ANALYTIC THREADS

Annual newsletter of the Department of Mathematics, Physics and Statistics

Fall 2017

Faculty News

Matthew Farrar

Congratulations to Drs. Emily (engineering) and Matthew Farrar on the birth of their second child. Finnian Jude Farrar was born November 22, 2016.

In November 2016, Farrar (with K. Kolkman and J. Fetcho of Cornell University) presented the poster "Structural and Functional Correlates of Variation in Neuronal Numbers in the Locus Coeruleus of Zebrafish Imaged with Multiphoton and High-speed Light Sheet Microscopy" at the Society for Neuroscience's 46th annual meeting in San Diego in California.

He also delivered the keynote address at the American Association of Physics Teachers – Central Pennsylvania Section meeting at the University of Scranton in April 2017. His presentation was titled, "Seeing Anew: How Advances in Microscopy Are Changing the Life Sciences."

Farrar has taken on the project management role for the Diagnostics of Viral Disease Collaboratory project, a project targeted toward determining viral loads in developing countries with endemic HIV infections.

Niklas Hellgren

Dr. Niklas Hellgren (with R. Haasch, S. Schmidt, L. Hultman and I. Petrov) published a paper in Carbon (November 2016) titled "Interpretation of X-ray Photoelectron Spectra of Carbon-nitride Compounds: New Insights from in Situ XPS."

In March 2017, Hellgren gave an invited presentation in the Lehigh University Center for Advanced Materials and Nanotechnology Seminar Series. His talk was titled "Inside Intel – The Materials Science of Advance Microprocessors."

Top: Participants in the Physics Club and Engineering Department took a field trip to the NASA Goddard Space Flight Center. They are pictured in front of a 1:5 model of the Hubble Space Telescope Bottom: Harry Hawbecker and participants attended the Physics Demo Show April 17, 2017.

Faculty news, continued on page 2

Abaz Kryemadhi

Congratulations to Dr. Abaz Kryemadhi, who was approved for a scholar chair for the 2017-2018 and 2018-2019 academic years! This includes a research stipend. This is the first such chair to be held in the MPS Department, or any of its predecessors.

Kryemadhi spent his fall 2016 sabbatical at the University of Tirana in Albania (his alma mater), where he placed a cosmic ray array which runs in tandem with an identical one at Messiah College. The goal was to search for rare astrophysical events, such as a break of early universe domain walls or high energy cosmic rays and dark matter. In addition to the research goals, he also mentored two junior faculty members and a master's student working on a thesis with the goal of developing experimental particle physics in Albania. Development of experimental particle physics is a requirement for Albania in order to join the Conseil Européen pour la Recherche Nucléaire (CERN), or European Council for Nuclear Research, which has the largest particle accelerator in the world.

In September 2016, while at the University, Kryemadhi presented "Development of Compact Particle Detectors" at the Second International Workshop on Recent Large Hadron Collider (LHC) Results and Related Topics. This workshop was sponsored by the French and Italian Embassies in Albania.

He also traveled to Siena, Italy, in October 2016 to attend the 14th Topical Seminar on Innovative Particle and Radiation Detectors, where he presented "Performance of LYSO and CeBr3 Crystals Readout by SiPM Arrays as Compact Detectors for Space Based Applications". This conference was limited to 150 experts worldwide in innovative particle detectors.

Kryemadhi (with Messiah undergraduate physics and engineering students L. Barner, A. Grove, J. Mohler, C. Sisson and A. Roth) published a paper in Journal of Instrumentation (February 2017) titled "Performance of LYSO and CeBr3 Crystals Readout by Silicon Photomultiplier Arrays as Compact Detectors for Space Based Applications."

Kryemadhi and students Lindsey Barner '17, Alexander Roth '17, Jacob Mohler '18 and Andrew Grove '18 spent spring break 2017 working at the Fermi National Accelerator Laboratory in Batavia, Illinois. They performed testing on a new dark matter detection prototype they had developed as part of a NASA-funded project. A NASA grant ($5,652) was received this year to fund students and travel to Fermi. The Department of Energy, which supports Fermi, provided an in-kind contribution to allow use of the accelerator facility at no charge (estimated at $70,000).

The 2016-2017 academic year marked the second year of Kryemadhi's 2016-2018 Templeton Foundation Grant. He is working with Robin Collins (philosophy) to further the discoverability livability hypothesis drawing from particle physics.

He also served as president of the American Association of Physics Teachers - Central Pennsylvania Section for 2016-2017.

Cynthia Lehman

Professor Cindy Lehman participated in the Council for Christian Colleges & Universities (CCCU) workshop, "Best Practices for Teaching First-Generation Latino Students: A Practical Workshop," which was held in San Jose, Costa Rica, in May and June 2017.

Douglas Phillippy

Congratulations to Dr. Doug Phillippy on his promotion to professor! In June 2017, Phillippy presented "Finding Meaning in Calculus (and Life)" at the 21st Biennial Conference of the Association of Christians in the Mathematical Sciences (ACMS) held at Southern University in Charleston, South Carolina.

Note: For personal reasons (moving), Dr. Gene Chase (retired) did not attend this conference – the first time that he had missed an ACMS conference.

As many of you know, Phillippy is a serious runner. In October 2016, he finished first in his age group in a half-marathon in Hershey. In November 2016, he finished second in his age group in a marathon in Harrisburg.

Samuel Wilcock

In June 2017, Dr. Sam Wilcock was a ninth-time participant in the Statistics AP Reading held in Kansas City, Missouri. He joined several departmental alumni in that endeavor.

> "Dr. Kryemadhi spent his Fall 2016 sabbatical at the University of Tirana in Albania [...] to search for rare astrophysical events such as [...] high energy cosmic rays and dark matter.

Welcome

Amanda Lohss

In fall 2017, Dr. Mandy Lohss will join the Department of Mathematics, Physics and Statistics as an assistant professor of mathematics. She received her Ph.D. in mathematics (probabilistic combinatorics) from Drexel University in 2017. Previously, she earned a B.S. and M.S., both in mathematics, from York College of Pennsylvania and Drexel University, respectively.

Lohss enjoys collaboration with other mathematicians and is looking forward to working with undergraduate students, as well. She is especially anticipating being a faculty member in a Christian liberal arts college. As a young professional, she already has numerous professional presentations and publications to her credit.

She has passed the first two actuarial certification exams (P - Probability and FM – Financial Mathematics) and will play an integral role in our actuarial science major, which debuts in fall 2017.

Lohss has been accepted as a Project NExT Fellow by the Mathematical Association of America (MAA). Project NExT (new experiences in teaching) is a national and competitive professional development program for new or recent Ph.D.s in the mathematical sciences. Fellows learn together about all aspects of an academic career: improving the teaching and learning of mathematics; engaging in research and scholarship; finding exciting and interesting service opportunities; and participating in professional activities. As a fellow, she attended, and will attend, targeted professional development seminars at MAA national meetings in July 2017, January 2018 and July 2018. She lists her hobbies as running, traveling and hiking. She and her husband Shane are natives of Dover, Pennsylvania. He is currently a third-year medical student at Lake Erie College of Osteopathic Medicine. Previously, he earned his B.S. in biology and MBA, both at York College of Pennsylvania.

Belated Welcome

Harry Hawbecker

In fall 2016, Harry Hawbecker joined the Department of Mathematics, Physics and Statistics as a physics laboratory technician and adjunct instructor of physics.

Hawbecker was born in Monterrey, Mexico. He moved with his family to Laredo, Texas, when he was two years old. After college, he moved to Tallahassee, Florida, and then to Pennsylvania in July 2015.

Hawbecker earned his B.S. in physics and mathematics from Texas Christian University. Later, he did graduate work in physics at Florida State University. Prior to coming to Messiah, he worked for 13 years as an education assistant at Challenger Learning Center of Tallahassee and for two years teaching high school physics at Florida State University High School.

His hobbies are inventing and making items to demonstrate how wonderful physics and science are; woodworking; refurbishing antique items, especially old science equipment; rock hounding and collecting; and selling things he made online.

Hawbecker lives with his wife Johanna and daughter Maya Elisabeth (12) in Camp Hill. Johanna received her B.S. in social work from Texas Christian University and MSW from Florida State University. She is the executive director of the National Association of Social Workers – Pennsylvania Chapter in Mechanicsburg.

Thank You & Farewell

Christine Robinson

Spring 2017 was Dr. Christine Robinson's last term at Messiah. She joined our department in fall 2014 as assistant professor of mathematics. She has moved with her family – husband Matthew and children Wesley (7) and Zola (4) – to Bonn, Germany. The Robinsons previously lived in Berlin (2012-2013) while she was writing her dissertation and he was doing dissertation research at the University of Berlin.

When she came to Messiah, her husband was completing his Ph.D. in religious studies, with a concentration in theology, from Northwestern University. He was awarded his doctorate in 2015. His dissertation was on Friedrich Schleiermacher's idea of "free sociability" and the role of close personal relationships in the individual religious development.

In fall 2016, he accepted a three- to six-year postdoctoral position (research and teaching) on the faculty at the University of Bonn. She is currently teaching part time at the International University of Bad Honnef while looking for a full-time position. In fall 2017, she will begin an MSc program in Life Science Informatics at the University of Bonn.

We will greatly miss her. Her commitment to high standards in teaching and research inspired us. Her energetic approach to life often left some of us feeling fatigued. She was a valued colleague and took leadership of several department initiatives. She always found time to talk with colleagues and students. Her interest in students and mathematics led her to serve as the advisor of the Math Club.

Students and colleagues with their families celebrated her tenure at Messiah with an open house brunch hosted by Professor Lehman with primary coordination provided by several students.

We wish her and her family well in their future endeavors.

Student News

Honors

Congratulations to the Department's top scorer on the physics major field test, **Tyler McManiman**!

Congratulations to the Department's top scorer on the mathematics major field test, **Benjamin Kragt**!

Meagan Scala graduated with department honors in mathematics. Her thesis was titled "Tournaments on Tournaments: Using Graph Theory to Analyze Tennis Tournaments."

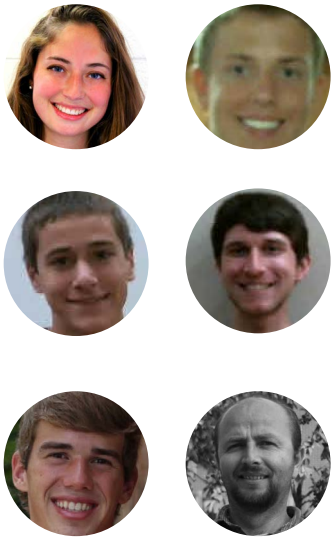
Kelly Schwiker graduated with department honors in mathematics. Her thesis was titled "Applying Graph Theory to NCAA Basketball Tournaments."

Emilie Smetak graduated with department honors in mathematics. Her thesis was titled "Modeling and Forecasting Zimbabwe's Trade Exports with Time Series Analysis."

Nicholas Weaver graduated with department honors in mathematics. His thesis was titled "Graph Coloring Games."

Presentations

In January 2017, **Lindsey Barner '17**, **Alexander Roth '17**, **Jacob Mohler '18, Andrew Grove '18**, **Caleb Sisson '19** and **Dr. Kryemadhi** presented "Development of Compact Particle Detectors for Space Based Instruments" at the April meeting of the American Physical Society in Washington, DC.

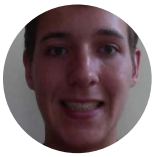


(From left to right): Lindsey Barner ('17), Alexander Roth ('17), Jacob Mohler ('18), Andrew Grove ('18), Caleb Sisson ('19), and Dr. Kryemadhi

Student news, continued on page 4

Summer Activities 2017: Discipline-Related

Lindsey Barner '17 had an internship at the Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland.



Jacob LaGrand '18 had an informatics/data analytics internship at PerformCare a subsidiary of AmeriHealth Caritas in Harrisburg, Pennsylvania.

Trieu Luu '19 had an internship at Aurora AR in San Francisco, California. He used his Messiah skills while working on optics (physics), tracking and graphics (linear algebra).

Hallie Miller '18 had a SURF (Summer Undergraduate Research Fellowship) at the National Institute and Standards of Technology in Gaithersburg, Maryland.

Class of 2017: Employment and Education Placements *(To Date)*

Tyler McManiman (physics with certification): Northern High School in Dillsburg, Pennsylvania – physics teacher

Sara Melson (mathematics with certification; computer science minor): Littlestown High School in Littlestown, Pennsylvania – mathematics teacher

Andrew Murray (physics with certification): Twin Tiers Christian Academy in Breesport, New York – physics teacher

Meagan Scala (mathematics; accounting minor): Walz Group in Lancaster, Pennsylvania – accounting/audit intern

Kelly Schwiker (mathematics; computer science minor): Northwestern Mutual in Scranton, Pennsylvania – college financial representative

Emilie Smetak (mathematics, English – writing concentration): public policy and international development (MPP) at College of William and Mary

Nicholas Weaver (mathematics; statistics minor, economics minor): applied mathematics (Ph.D.) – University of Colorado-Denver

Department News

The Department of Mathematics, Physics and Statistics houses six majors: actuarial science, mathematics, mathematics with certification, physics (B.A.), physics (B.S.) and physics with certification. It also houses three minors: mathematics, physics and statistics. Full-time faculty members are Dr. Eby, Dr. M. Farrar, Dr. Hare, Dr. Hellgren, Dr. Kryemadhi, Prof. Lehman, Dr. Lohss, Dr. Phillippy, Dr. Widmer and Dr. Wilcock (chair).

MPS Department Graduates

Eleven students graduated in December 2016 and May 2017 with majors in the MPS Department. One of these was a double major with the second major in another department. Here is the breakdown by major.

Mathematics: *6*

Mathematics with certification: 3

Physics with certification: 2

Program News

Actuarial Science

In fall 2017, the Department of Mathematics, Physics and Statistics will launch a new major: actuarial science (B.S.). It is a mathematics-statistics interdisciplinary major and will be somewhat unique as it will combine the requirements of the actuarial profession with many of the requirements of our mathematics major. This will allow flexibility for those actuarial science majors who change their mind and want to easily move into another major (e.g., mathematics). Generally, the actuarial science programs at other schools do not have this flexibility.

This major necessitates the creation of only two new courses: MATH 450 – Mathematics of Finance II and STAT 345 – Time Series Analysis. MATH 350 – Mathematics of Finance I had previously been catalogued as an upper-level elective for mathematics and mathematics with certification majors. For the complete curriculum, see messiah.edu/ascourses.

We are building an actuarial science resource list of Messiah Colleges graduates who are working, or have recently worked, at any level in the actuarial science field. If Dr. Eby has not already contacted you about having your name included on that list, please email him at eby@messiah.edu.

If you are one of these graduates, we hope that you will be willing to be on our list of actuarial science resource persons. Sometimes, a student has a question that is best answered by a professional actuary. It is helpful for us and them if we can refer them to you and they can ask their question directly by email. We also hope that some of you, if your logistics allow, will be able to visit us sometime to meet with and speak to our students. Please do not feel any pressure from us to be involved more than you wish or are able to.

Mathematics

One of the major 2016-2017 Math Club (Math Problem-Solving Group) activities was building an 18.75-inch (cube) Menger sponge (or Menger universal curve) using 2,784 business cards. The final product was displayed in Murray Library. (See photo.) Dr. Robinson advised the club in the fall and Dr. Widmer advised the club in the spring.

Menger sponge on display in Murray Library

Physics

In November 2016, the MPS Department, together with the Biological Sciences Department and the Chemistry & Biochemistry Department, hosted the Seventh Annual Nobel Prize Seminar. Dr. Hellgren gave a presentation on the Nobel Prize in Physics for theoretical discoveries of topological phase transitions and topological phases of matter.

Also in November 2016, three students were inducted into the Sigma Pi Sigma Physics Honors Society: Lindsey Barner '17, Andrew Grove '18 and Hallie Miller '18.

In January 2017, the Physics Club, together with members of the engineering department, took a field trip to the NASA Goddard Space Flight Center in Greenbelt, Maryland.

The DEMO SHOW was a popular activity in April 2017. It was conducted by the Physics Club and Mr. Hawbecker. They offered an interactive program featuring fire and lasers dancing to music, glowing liquids and lightning bolts. About 100 people attended. After the show, children performed some hands-on experiments.

The first cohort of physics minors graduated in May 2017: Lindsey Barner, Alexander Roth and Jonathan Lord. All three were engineering majors.

Opportunities for Adjunct Teaching at Messiah

Are you or someone you know interested in teaching mathematics or physics at Messiah College? Interested persons with at least a master's degree in a related field are encouraged to send their resume and statement of interest to Dr. Wilcock at One College Avenue, Suite 3041, Mechanicsburg, PA 17055-6807. The MPS department often needs part-time adjunct instructors to teach general education courses, and we welcome applications from alumni and their friends and family.

Address Reminder

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Name of faculty member
One College Avenue, Suite 3041
Mechanicsburg, PA 17055-6807

Top: D0 Particle Detector at Fermi Laboratory
Top Left: Dr. Kryemadhi with Lindsey Barner, Jacob Mohler, Alexander Roth, and Andrew Grove inside the D0 particle detector at Fermi Laboratory. The detector is approximately three stories high
Bottom: 2016-2017 inductees into the Sigma Pi Sigma Physics Honors Society: Hallie Miller, Lindsey Barner, and Andrew Grove

Alumni Campus Presentations

John Ripollone

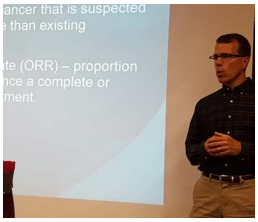
John Ripollone '12 (microbiology and biochemistry major, 5/6 statistics minor) visited Messiah March 1 -3, 2017. He received his MPH in biostatistics in 2013 from the State University of New York Downstate Medical Center and is currently a Ph.D. candidate in epidemiology at Boston University. At the time of his visit, he was clinical data manager for the Massachusetts Veterans Epidemiology Research and Information Center, VA Boston Healthcare System in Boston.

John Ripollone lecturing in STAT 325 – Experimental Design on March 3

Ripollone gave three presentations: in the Biological Sciences Seminar on March 2 ("Biology and Statistics as Critical, but Imperfect, Tools for Causal Inference in Epidemiology"), in the STAT 292 – Statistics for the Mathematical Sciences II class and STAT 325 – Experimental Design class on Friday.

Jonathan Hartzel

Jon Hartzel '93 (mathematics major, statistics minor) visited Messiah April 21, 2017. He received his Ph.D. in statistics in 1999 from the University of Florida and is currently executive director, diostatistics at Merck Research Laboratories in Blue Bell, Pennsylvania. He gave a specially-scheduled presentation titled "My Life as a Biostatistician."



Jonathan Hartzel's Statistics presentation on April 21 in Frey 143 (a room that no longer exists)

Collaboratory News

Staff and students from the MPS Department continue to be heavily involved in projects within the Collaboratory for Strategic Partnerships and Applied Research (messiah.edu/collaboratory/).

Future Events

Saturday, October 21, 2017

Homecoming "+/- 4 Continental Breakfast" - All 2014, 2015, 2016 and 2017 MPS Department graduates are invited to a continental breakfast in Frey 350 from 9 to 10:30 a.m. on Homecoming Saturday. All department students will also be invited. We look forward to a beneficial time for all alumni, students and staff in attendance. In particular, our current students can learn much from our alumni. If possible, plan to be there for the entire time. Email our administrative assistant, Jean McCauslin (jmccausl@messiah.edu) by Wednesday, October 18, if you plan to attend.

Monday, November 13, 2017

Alumni Mathematics and Physics Teacher Dinner - Each fall, our MATH 407 (Professional Issues in Secondary Mathematics Education) and PHYS 407 (Professional Issues in Secondary Physics Education) classes of current student teachers invite alumni who are secondary mathematics or physics teachers to join them for dinner. They are very interested in hearing your advice for new teachers, how to find a good job and how to be an effective and sane teacher of adolescents. The dinner will be held from 6 to 7:30 p.m in the Private Dining Room (PDR) near Lottie Nelson Dining Hall. It is free, and the conversation is friendly and helpful. If you are a secondary mathematics or physics teacher and can join us, please email our administrative assistant, Jean McCauslin (jmccausl@messiah.edu) by November 6.

Friday May 4, 2018

School of Science, Engineering and Health 14th Annual Symposium - The MPS Department's involvement in an event like this began as the School of Mathematics, Engineering and Business (MEB) Scholarship Day. It then became the MEB Student Scholars' Expo. With the formation of the School of Science, Engineering and Health, it became the School of Science, Engineering and Health Annual Symposium. If you live within driving distance of the College, we encourage you to visit this symposium, which is always held on the last Friday of the spring term and features student (mostly) and staff presentations. There is no registration fee, and snack breaks are provided. For details including abstracts, check the SEH School website in Spring 2018 (messiah.edu/seh_symposium).

Request for Internship Opportunities

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Support Opportunities

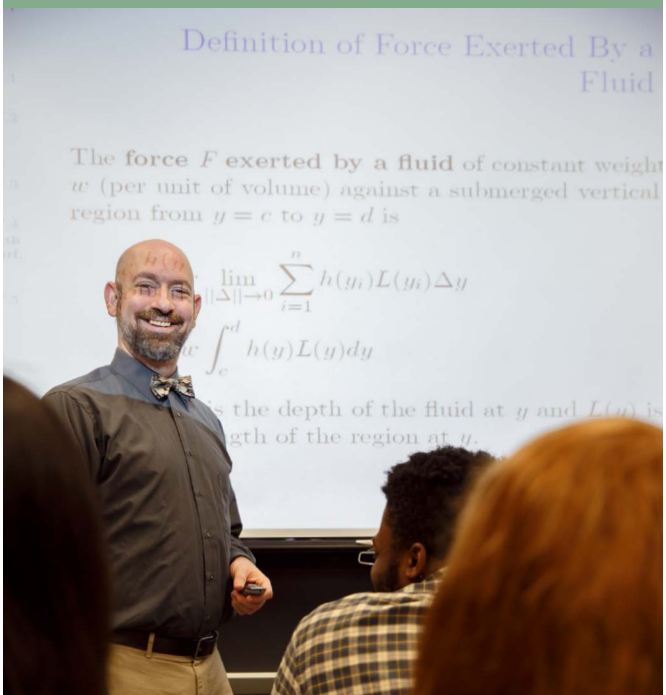
Your continuing support of Messiah College in all ways is greatly appreciated. With respect to financial support, some of you may wish to target donations to specific projects related to the department. Of course, your gift is doubled when your employer has a matching gift program. Consider a gift to the College that is earmarked as described below.

- Send your *tax-deductible gift* – check made payable to Messiah College – to Office of Development, One College Avenue, Suite 3013, Mechanicsburg, PA 17055-6807.
- To make a *donation to the Department of Mathematics, Physics and Statistics*, put MPS Dept. on the memo line of your check.
- To *support the Collaboratory Diagnostics of Viral Disease project*, put Collab. – DVD project on the memo line of your check.
- The *SEH School* has an enrichment fund that is used to fund student travel to out-of-state academic conferences to present their work. This fund rolls over year to year, so it is a great place for one-time gifts. Donors should specify SEH School – Enrichment Fund.
- If you are interested in *contributing to a scholarship for students in the MPS Department*, contact the Office of Development. It takes $25,000 to underwrite (seed) a scholarship.
- If you are interested in *contributing to an endowed scholarship chair for faculty members in the MPS Department*, contact the Office of Development. It takes $2 million to underwrite an endowed scholarship chair.

Mathematics

Reason logically to answer challenging questions.

Go beyond the realm of mere facts and numbers as you develop creative problem-solving skills you can apply to complex problems in almost any field. With Messiah's Christian professors as your guides, experience the intricate balance of art and science and learn to maximize both your intuitive and analytical skills. You'll also grow to appreciate how your Christian faith and mathematics complement each other as you acquire the intellectual and spiritual vigor necessary to ***interpret information and solve problems.***



Physics

Probe a universe of interactions.

Study the building blocks of the universe, from quarks to galaxies, and explore the basic laws and forces of nature. Then, with a solid theoretical foundation and hands-on research experience, you may just find yourself mapping out the dark matter in the universe or discovering the optimal atomic structure for next-generation solar cells.

Study complex theories in class, then apply what you've learned through hands-on research or an internship where you'll ***solve problems and serve communities.***

MESSIAH COLLEGE

DEPARTMENT OF MATHEMATICS, PHYSICS AND STATISTICS

One College Avenue Suite 3041
Mechanicsburg PA 17055

Address Service Requested

ANALYTIC THREADS

Analytic Threads is the annual newsletter of the Department of Mathematics, Physics and Statistics (MPS) at Messiah College. It is sent annually to alumni and is also available electronically at the website **messiah.edu/MPS** .

Parting Thoughts

We hope that all is well with you and your families. We enjoy receiving updates and having you visit us at Messiah. However, we will generally not publish your updates. Since your circle of connections at Messiah College was bigger than the MPS department, we encourage you to send the updates that you want to be published to the Class Notes section of The Bridge, the College's magazine for alumni, parents and friends (messiah.edu/alumni/sendnews).

To update your email address, please contact our administrative assistant, Jean McCauslin, at jmccausl@messiah.edu.

Editor: Dr. Marlin Eby (Eby@messiah.edu)

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MESSIAH COLLEGE

ANALYTIC THREADS

Annual newsletter of the Department of Mathematics, Physics and Statistics

Fall 2018

Faculty News

Matthew Farrar

Dr. Matthew Farrar presented "A Direct Comparison of the Relative Efficacy of Modeling- Based vs. Highly Structured Introductory Physics Labs" at the spring 2018 meeting of the American Association of Physics Teachers – Central Pennsylvania Section.

Niklas Hellgren

Dr. Niklas Hellgren spent spring 2018 on sabbatical at Linköping University in Sweden where he worked on high power impulse magnetron sputtering (HiPIMS) of TiB2 thin films.

Abaz Kryemadhi

Dr. Abaz Kryemadhi, along with Lindsey Barner '17, Andrew Grove '18, Jacob Mohler '18 and Alexander Roth '17, published A LYSO crystal array readout by silicon photomultipliers as compact detector for space applications in "Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment" (October 2017).

Matthew Bressler '16, along with Lydia Goodwin '17 and Dr. Kryemadhi, published "Cosmic Ray Topography in American Journal of Physics" (November 2017).

In July 2017, Dr. Kryemadhi gave an invited presentation, A LYSO crystal array readout by silicon photomultipliers as compact detectors for space applications, at the New Development in Photodetection Conference in Tours, France. This conference was limited to 240 experts worldwide in innovative particle detectors.

The 2017-2018 academic year marked the third year of Dr. Kryemadhi's 2016-2018 Templeton Foundation Grant. He is working with Dr. Robin Collins (Philosophy) to further the discoverability livability hypothesis drawing from particle physics.

Cynthia Lehman

Congratulations to Professor Cindy Lehman on her selection for the first group of Sawyer Faculty Fellows at Messiah College. This inaugural group will explore ways in which technology can support and enhance their pedagogy, thus improving the digital proficiency of their students. These fellows participated in a summer 2018 intensive where they gained foundational knowledge similar to that which will be received by students who register for the fall 2018 Sawyer Certificate Program. Fellows will build upon the intensive by continuing to collaborate through a professional learning community (PLC) during the academic year. They also will also share the results of their project with their Messiah peers.

Professor Lehman (along with Professor Daniel Inouye) presented "Inclusive Excellence: First Generation Latino Students" in October 2017 as part of the fall 2017 Teaching Tuesdays Series at Messiah College.

Amanda Lohss

Dr. Mandy Lohss presented "The Statistical Structure of Concave Compositions" in August 2017 at the 18th International Conference on Random Structures and Algorithms held at The Institute of European Culture in Gniezno, Poland.

In November 2017, she was an invited speaker for Dickinson College's Math and Computer Science Chat series. Her topic was Tableaux and the ASEP.

Dr. Lohss presented "Regular Permutation Graphs" in November at the fall 2017 meeting of the Mathematical Association of America EPaDel Section held at Shippensburg University.

In January 2018, she gave the invited presentation, "Tableaux and the ASEP," in the AMS (American Mathematical Society) Special Session on Applied and Computational Combinatorics at the Joint Math Meetings in San Diego.

Dr. Lohss received a National Science Foundation research grant for 2018-2019. She will be working with three student collaborators: Ryan Althoff '21, Daniel Diethrich '19 and Emily Wichert '19.

In 2018-2019, Dr. Lohss will continue as a Project NExT Fellow in the Mathematical Association of America (MAA). Project NExT (new experiences in teaching) is a national and competitive professional development program for new or recent Ph.D.'s in the mathematical sciences. Fellows learn together about all aspects of an academic career: improving the teaching and learning of Mathematics, engaging in research and scholarship, finding exciting and interesting service opportunities, and participating in professional activities. As a fellow, she attended and will attend, targeted professional development seminars at MAA national meetings in July 2017, January 2018 and July 2018.

Douglas Phillippy

Dr. Doug Phillippy published "Finding Meaning in Calculus (and Life)" in Association of Christians in the Mathematical Sciences (ACMS) 21st Biennial Conference Proceedings (May 2018).

Faculty news, continued on page 2

Samuel Wilcock

Congratulations to Dr. Sam Wilcock on his selection for the first group (2018-2019) of Sawyer Faculty Fellows at Messiah College.
In June 2018, Dr. Sam Wilcock was a tenth-time participant in the Statistics AP Reading held in Kansas City, Missouri. He joined these departmental alumni in that endeavor: Doug Tyson '92, Leigh (Leisenring) Nataro '92, Kevin Robinson '93, Bryan Crissinger '97 and Erica (English) Chauvet '01.

Retired Faculty News

Marvin Brubaker

Numerous times since his retirement after the spring 2005 term, Dr. Marvin Brubaker has been invited back to campus by Dr. Phillippy to guest lecture in one of his classes. In spring 2018, he lectured on Applications of the Parabola in MATH 308 (Differential Equations) and on Recursion and Its Applications in MATH 195 (First Year Mathematics Seminar).

Welcome

Binbin (Ben) Huang

In fall 2018, Dr. Ben Huang will join the Department of Mathematics, Physics, and Statistics as assistant professor of Mathematics. He received his Ph.D. in Mathematics from Binghamton University-SUNY (State University of New York) in May 2018, with research on pseudodifferential calculus over manifolds with boundary with modest decay. He received his B.A. in mathematics and applied mathematics from South China Agricultural University. Dr. Huang is involved in a few on-going projects with his doctoral advisor, including textbooks and research papers.

Dr. Huang grew up in an atheistic environment and came to know Christ as his savior through a Chinese Christian Fellowship group in Binghamton. He is also a music lover and amateur guitar player/singer. He serves as worship leader/coordinator regularly in his current Chinese Christian church in Binghamton. He is always looking to collaborate and exchange ideas with other music lovers.

Lamarr Widmer, pictured above with his mother-in-law, Julia Kimani Kinuthia, and his father-in-law, Gershon Kinuthia Nganga, is retiring after 30 years at Messiah College.

Thank You & Farewell

Lamarr Widmer

Spring 2018 marked the end of professor of Mathematics Lamarr Widmer's long tenure at Messiah College. He came to Messiah College as a theoretical mathematician in fall 1988 after completing his Ph.D. in mathematics at the University of Iowa. He had previously earned his B.A. and M.S. there.

After earning his B.A., Dr. Widmer worked for the world's largest printer of business forms (Moore Business Forms) for one year and then spent seven years with the Mennonite Central Committee (MCC). After a year of French language study in Brussels, Lamarr spent six years teaching secondary mathematics at an American Baptist school in Zaire (now the Democratic Republic of the Congo).

While on the faculty at Messiah, Dr. Widmer spent two academic years in Kenya. In 1994-1995, he was the Messiah College teaching representative to Daystar University which was affiliated with Messiah at that time. During that year, he developed a relationship with Margaret Kinuthia, Assistant Registrar at Daystar.

That friendship blossomed into a romance and they were married in 1999. Over the years, they have returned to Kenya numerous times for family visits.

For his sabbatical in 2009-2010, Dr. Widmer returned to Daystar to teach and advise them in the development of a mathematics major. By then, Daystar had become an independent university.

Dr. Widmer was part of several Collaboratory teams whose work focused on meeting critical needs in several African nations. He was particularly well suited for this involvement due to his love of Africa, his concern for these needs, and working knowledge of the French language. In this role, he was part of numerous site visits: Burkina Faso (1 time), Ghana (4), Kenya (1), and Mali (4).

As a theoretical mathematician, Dr. Widmer loves abstract theory. In midcareer, he said, "I'm freshly discovering how much fun it is to be curious." In several of his courses, he sought to infect his students with this curiosity by having them explore where his and their curiosity led.

In his 30-year tenure at Messiah, he taught many courses taken by department majors: Calculus I, Calculus II, Discrete Mathematics, First Year Mathematics Seminar, Calculus III, Linear Algebra, Numerical Analysis, Differential Equations, Algebraic Structures (his favorite course to teach), History of Mathematics, Introduction to Mathematical Research, Senior Mathematics Seminar, Principles of Proofs, Number Theory, Complex Variables and Algebraic Structures II.

Dr. Widmer advised the Math Problem-Solving Group (Math Club) for many years. He also supervised honors projects in mathematics for five students: Kayla Blyman '09, Joel Derstine '93, Scott Pickard '05, Matthew Wright '06 and Nicholas Zoller '03.

Dr. Widmer was one of two co-editors of the Problems Section of The Journal of Recreational Mathematics for many years. In that role, he selected and clarified mathematical problems and their solutions. As an outgrowth of that role, he assisted in the organization of the first two MOVES (Mathematics of Various Entertaining Subjects) Conferences held at the National Museum of Mathematics (MoMath) in New York.

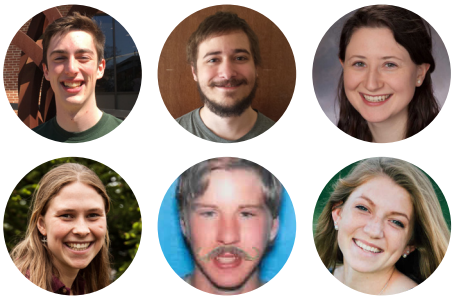
Dr. Widmer's post-retirement plans include gardening and lawn work, enjoying his 1979 Ford, keeping up with the responsibilities of his position at Slate Hill Mennonite Church, and daily walks with his wife. He plans to take one year to determine how busy he wishes to be before likely committing to a couple of volunteer opportunities and/or part time employment.

Dr. Widmer will be greatly missed by his colleagues. We appreciated his enthusiasm for teaching, concern for our students, reliability, and steadying influence in department deliberations. He was a real team player.

Former students and colleagues will have an opportunity to celebrate Dr. Widmer's retirement with him at a reception during Homecoming. (See the Future Events section.)

Student News

Honors



Clockwise from top left: Jason Price, Jacob Mohler, Hallie Miller, Leanne Weaver, Kyler Shea, Olivia Tamm

- Congratulations to the Department's top scorer on the mathematics major field test, **Jason Price**! Price graduated with department honors in mathematics. His thesis was entitled "Diophantine Equations."
- Congratulations to the Department's top scorer on the physics major field test, **Jacob Mohler**!
- **Hallie Miller** graduated with department honors in physics. Her thesis was entitled "Growth and Characterization of ZnSe Thin Films by RF Mgnetron Co-sputtering."
- **Olivia Tamm** graduated with department honors in mathematics. Her thesis was entitled "Spherical Geometry and its Applications."
- **Kyler Shea '21** was selected as the Middle Atlantic Conference (MAC) Cross Country Male Rookie of the Year.
- **Leanne Weaver '20**, the MAC Outdoor Track Female Athlete of the Year, was the MAC champion in the 800 m, 400 m Hurdles, and 4 x 400 m relay. She qualified for the NCAA III National Outdoor Track & Field Championships where she finished 10th. Leanne earned U.S. Track & Field and Cross Country Coaches Association (USTFCCCA) All-Academic honors for NCAA Division III Women's Track & Field. During this past season, she improved her own Messiah College 800 meter school record to 2:10.97.

Presentations

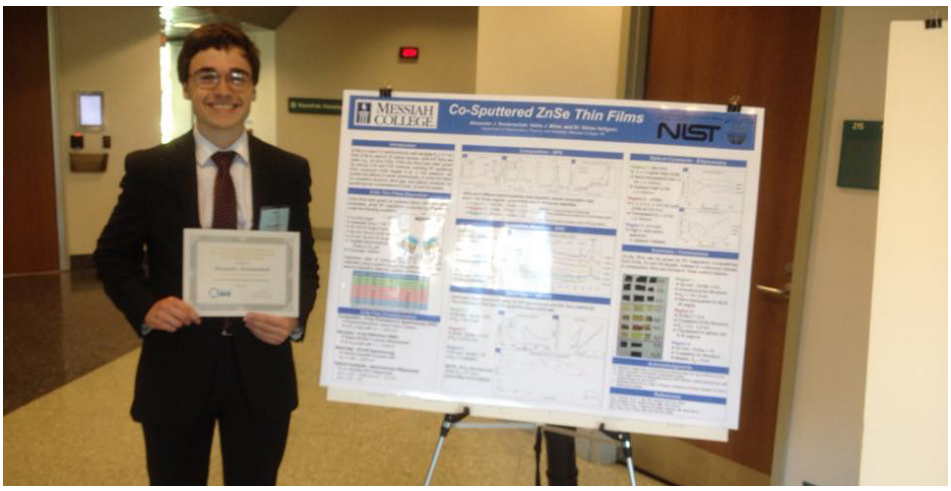
In May 2018, Alexander Sredenschek presented the poster Co-Sputtered ZnSe Thin Films at the American Vacuum Society Mid-Atlantic Chapter Meeting held at the National Institute of Standards and Technology (NIST) in Gaithersburg, Maryland. This poster was based on research that he and Hallie Miller '18 conducted under the supervision of Dr. Hellgren. In competition with graduate students from research universities, Alex won Honorable Mention and a $50 cash prize.

Presentations at the 15th Annual Symposium of the School of Science, Engineering, and Health on May 4, 2018

Mathematics

- **Laura Bigelow '19**: "What Math is Really True?"
- **Jacob LaGrand '18**: "The History of the Fourier Series"
- **Ming Luo '18**: "Series Solutions of Linear Equations"
- **Hannah Mackenzie '18**: "PageRank Algorithm – A Glimpse of Understanding Google"

Student news, continued on page 4



Alex Sredenschek presented at the Mid-Atlantic Chapter meeting of the American Vacuum Association.

Clockwise from top left: Laura Bigelow, Jacob LaGrand, Ming Luo, Joshua Skula, Thien Nguyen, Hannah Mackenzie

- **Thien Nguyen '18**: "Dota 2 eSport Tournament Prediction"
- **Jason Price '18**: "Diophantine Equations"
- **Joshua Skula '18**: "An Examination of the History, Structure, and Applications behind Quaternions"
- **Alexander Sredenschek '19**: "Fourier Series"
- **Olivia Tamm '18**: "Spherical Geometry and its Applications"

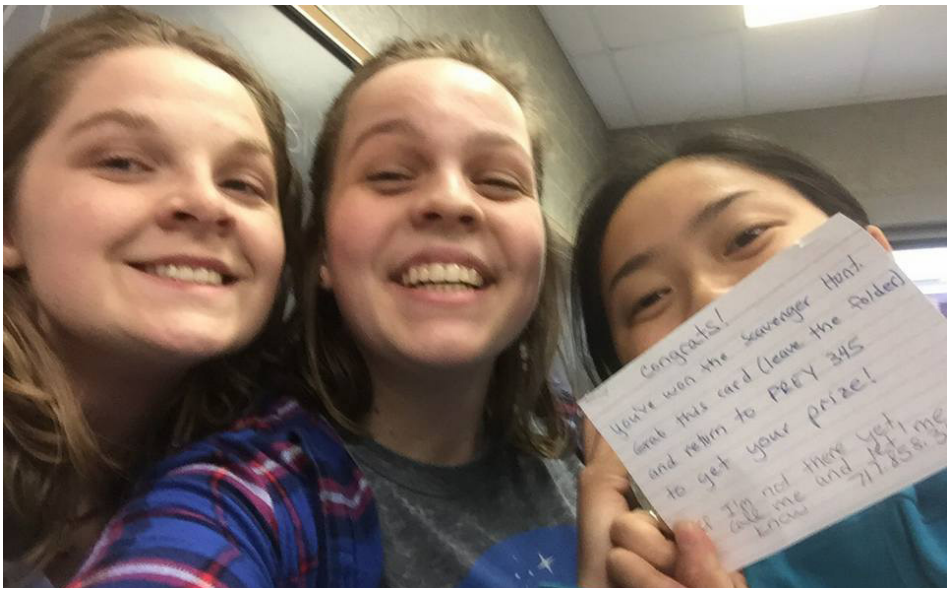
Physics

- **Andrew Grove '18**: "Portable Cosmic Ray Muon Detector for Education"
- **Hallie Miller '18** and **Alexander Sredenschek '19**: "ZnSe Film Growth via Magnetron RF Sputtering"
- **Jacob Mohler '18**: "Fractional Calculus"

Summer 2018 Activities: MPS Discipline-Related

- **Ryan Althoff '21** had a statistics and accounting position in Student Financial Services at Messiah College.
- **Hallie Miller '18** and **Alexander Sredenschek '19** had a Physics Summer Undergraduate Research Fellowship (SURF) at the National Institute of Standards and Technology (NIST) in Gaithersburg, Maryland.

- **Bailey Rhodes '20** participated in a Physics and Chemistry REU (Research Experiences for Undergraduates) at Colorado State University.



Math Problem Solving Group's cryptology scavenger hunt

Class of 2018: Employment and Education Placements *(To Date)*

- **Joshua Conrady**, mathematics, engineering with computer engineering and electrical engineering concentrations: Deloitte in Mechanicsburg, Pennsylvania – Solutions Analyst
- **Jacob LaGrand**, mathematics, philosophy: Peace Corps in Lesotho – Secondary Mathematics Teacher
- **Hannah Mackenzie**, mathematics, youth ministries minor: Black Forest Academy in Kandern, Germany – Resident Assistant
- **Hallie Miller**, physics (B.A.): Materials Science and Engineering (Ph.D.) at University of Utah
- **Olivia Tamm**, mathematics with certification: West Shore Christian Academy in Shiremanstown, Pennsylvania – Secondary Mathematics Teacher

Department News

The Department of Mathematics, Physics and Statistics houses six majors: actuarial science, mathematics, mathematics with certification, physics (B.A.), physics (B.S.), and physics with certification. It also houses three minors: mathematics, physics, and statistics. Full-time faculty members are Dr. Eby, Dr. M. Farrar, Dr. Hare (Dean of the School of SEH), Dr. Hellgren, Dr. Huang, Dr. Kryemadhi, Prof. Lehman, Dr. Lohss, Dr. Phillippy, and Dr. Wilcock (Chair of the Department of MPS).

MPS Department Graduates

Eleven students graduated in December 2017 and May 2018 with majors in the

MPS Department. Two of these were a double major with the second major in another department. Here is the breakdown by major.

Mathematics: 5
Mathematics with certification: 3
Physics (BA): 2
Physics (BS): 1

Program News

Actuarial Science

In fall 2017, the Department of Mathematics, Physics and Statistics launched the actuarial science (B.S.) major and enrolled its first majors.

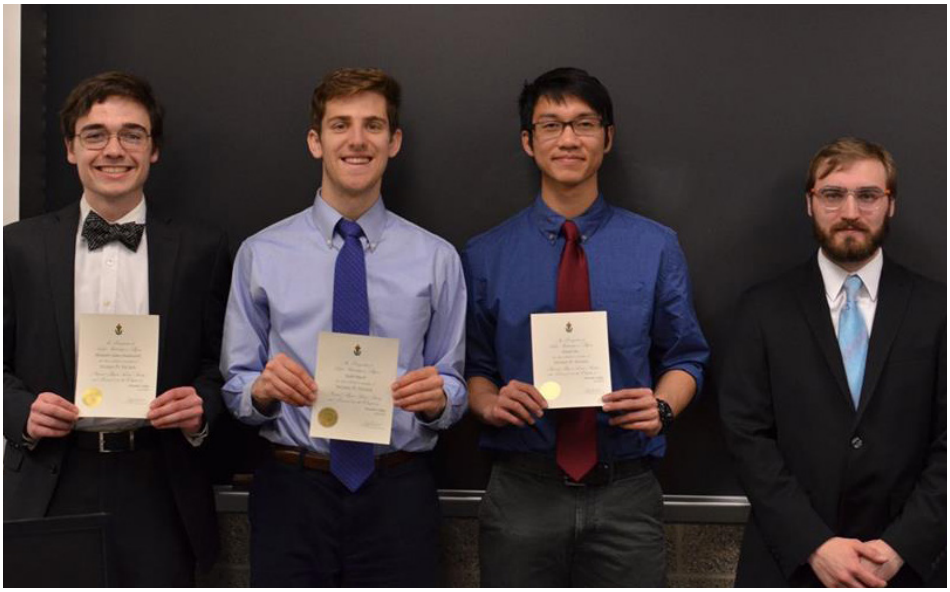
We are building an actuarial science resource list of Messiah College graduates who are working, or have recently worked, at any level in the actuarial science field. If Dr. Eby has not already contacted you about having your name included on that list, please email him at eby@messiah.edu. If you are one of these graduates, we hope that you will be willing to be on this list. Sometimes a student has a question that is best answered by a professional actuary. It is helpful for us and them if we can refer them to you and they can ask their question directly by email. We also hope that some of you, if your logistics allow, will be able to visit us sometime to meet with and speak to our students. Please do not feel any pressure from us to be involved more than you wish or are able to.

This year, Dr. Lohss received funding from the Library Special Projects Fund to buy resource materials for this new major.

Mathematics

With Dr. Lohss as advisor, the Math Problem-Solving Group was quite busy this year with these activities:

- **The Great Math Race (Service Event)**: assisted in the coordination of this event in which students from local high schools come to campus to interact with Messiah College students through fun math problems. The Club wrote all the math problems for this event and volunteered during the event to run some of the tables. Some of Messiah students also had lunch with the high school students to answer questions about Messiah College.
- **Putnam Exam Problems**: discussed previous problems to help prepare some of the students for the exam.
- **Cryptology Scavenger Hunt**: Dr. Lohss organized a scavenger hunt for the students in which each station had an encrypted code along with a description and brief historical background of the cipher used.
- **Movie Night**: watched a documentary on Isaac Newton.
- **Careers in Mathematics**: two Messiah College alumni spoke in a panel session focusing on Actuarial Science.
- **Math/Logic Puzzles**
- **Game Night**
- **Mathematical Origami**



2018 Sigma Phi Sigma Physics Honors Society inductees (from left) Alex Sredenschek, Kaleb Burch and Daniel Ma with alumnus Matthew Bressler

Physics

Messiah's 8th Annual Nobel Prize Seminar was held on Nov. 28, 2017. The Nobel Prize in Physics 2017 was discussed by Dr. Matthew Farrar. That prize was divided with one-half awarded to Rainer Weiss and the other half jointly awarded to Barry C. Barish and Kip S. Thorne "for decisive contributions to the LIGO (Laser Interferometer Gravitational-Wave Observatory) detector and the observation of gravitational waves."

The Physics Club Demo Show on Dec. 6, 2017 was a rousing success again. Demonstrations focused on gravity and motion, levitation, steam power and plasma in a bottle. After the show, there were some hands-on demonstrations in the lobby.

Three students were inducted into the Sigma Phi Sigma Physics Honors Society in March 2018: Alexander Sredenschek '19, Kaleb Burch '18, and Daniel Ma '19. The induction ceremony was combined with a Physics Club event in which alumnus Matthew Bressler '16 gave a presentation about his graduate research at Drexel University.

A new course, PHYS 218 – Speech Hearing Science, was approved as part of a new minor in Speech and Language Pathology. It will be offered for the first time in the 2018-2019 academic year. This course was developed, and will be taught, by Dr. Matthew Farrar. It focuses on acoustics as applied to sound generation, detection, and analysis.

Opportunities for Adjunct Teaching at Messiah

Are you or someone you know interested in teaching mathematics or physics at Messiah College? Interested persons with at least a master's degree in a related field are encouraged to send their resume and statement of interest to Dr. Wilcock at One College Avenue, Suite 3041, Mechanicsburg, PA 17055-6807. The MPS department often needs part-time adjunct instructors to teach general education courses, and we welcome applications from alumni and their friends and family.

Address Reminder

Use the following address format to contact a faculty member by regular mail.

Name of faculty member
One College Avenue, Suite 3041
Mechanicsburg, PA 17055-6807

Alumni Campus Presentations

Matthew Bressler '16
In March 2018, Matt Bressler, graduate student at Drexel University, presented on his research PICO: Using Tiny Bubbles to Probe the Universe's Biggest Mysteries.

David Kline '10
Dr. David Kline presented A Joint Spatial Model of Opioid Associated Deaths and Treatment Admissions in Ohio in April 2018. He earned his Ph.D. in Biostatistics from The Ohio State University and is currently a research scientist at The Ohio State University in the Department of Biomedical Informatics Center for Biostatistics.

Eric Mann '87 and Ryan Griffith '07
Eric Mann and Ryan Griffith (*pictured left*) spoke in the Math Problem-Solving Group Careers in Mathematics Series in April. Their event focused on actuarial science.

Collaboratory News

Staff and students from the MPS Department continue to be heavily involved in projects within the Collaboratory for Strategic Partnerships and Applied Research (messiah.edu/collaboratory).

Dr. Matthew Farrar is project manager for the Diagnostics of Viral Disease Project which is targeted towards determining viral loads in developing countries with endemic HIV infections.

Dr. Phillippy is Advisor for the Straight Vegetable Oil Project which completed its work product for Messiah alumnus Matthew Walsh '00 who now serves as a missionary in Burkina Faso.

Future Events

Saturday, Oct. 20, 2018

Homecoming Reception Honoring Dr. Widmer

All alumni are invited to attend a reception celebrating Dr. Widmer's 30 years at Messiah. It will be held during Homecoming (Saturday, Oct. 20, 2018) at Dr. Wilcock's home (5 Summit Drive, Dillsburg – just across the street from Shoemaker Soccer Field). Email our administrative assistant, Jean McCauslin (JMcCausl@messiah.edu) by Wednesday, Oct. 17 if you plan to attend.

Friday May 3, 2019

School of Science, Engineering and Health 16th Annual Symposium

The MPS Department's involvement in an event like this began as the School of Mathematics, Engineering and Business (MEB) Scholarship Day. It then became the MEB Student Scholars' Expo. With the formation of the School of Science, Engineering and Health, it became the School of Science, Engineering and Health Annual Symposium. If you live within driving distance of the College, we encourage you to visit this symposium, which is always held on the last Friday of the spring term and features student (mostly) and staff presentations. There is no registration fee, and snack breaks are provided. For details including abstracts, check the SEH School website in Spring 2019 (messiah.edu/seh_symposium).

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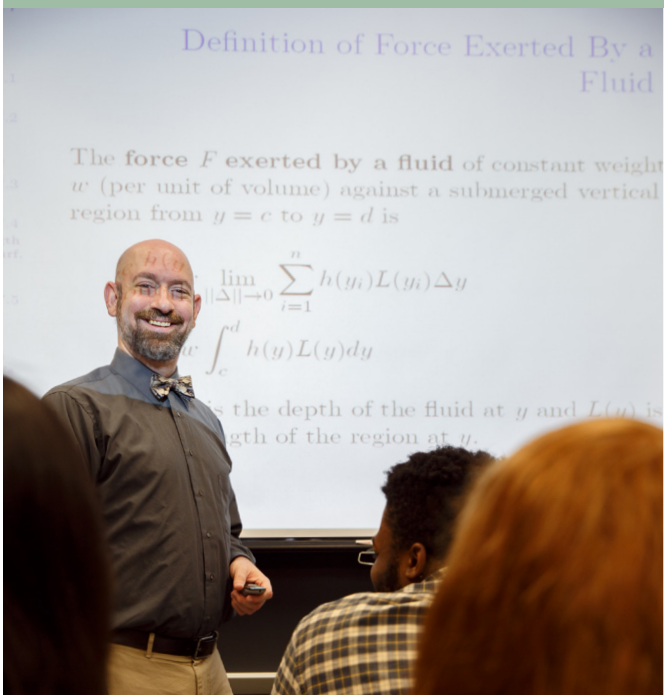
Mathematics

Reason logically to answer challenging questions.

Go beyond the realm of mere facts and numbers as you develop creative problem-solving skills you can apply to complex problems in almost any field. With Messiah's Christian professors as your guides, experience the intricate balance of art and science and learn to maximize both your intuitive and analytical skills. You'll also grow to appreciate how your Christian faith and mathematics complement each other as you acquire the intellectual and spiritual vigor necessary to ***interpret information and solve problems.***



Physics

Probe a universe of interactions.

Study the building blocks of the universe, from quarks to galaxies, and explore the basic laws and forces of nature. Then, with a solid theoretical foundation and hands-on research experience, you may just find yourself mapping out the dark matter in the universe or discovering the optimal atomic structure for next-generation solar cells.

Study complex theories in class, then apply what you've learned through hands-on research or an internship where you'll ***solve problems and serve communities.***

MESSIAH COLLEGE

DEPARTMENT OF MATHEMATICS, PHYSICS AND STATISTICS

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ANALYTIC THREADS

Analytic Threads is the annual newsletter of the Department of Mathematics, Physics and Statistics (MPS) at Messiah College. It is sent annually to alumni and is also available electronically at the website **messiah.edu/MPS** .

Parting Thoughts

We hope that all is well with you and your families. We enjoy receiving updates and having you visit us at Messiah. However, we will generally not publish your updates. Since your circle of connections at Messiah College was bigger than the MPS department, we encourage you to send the updates that you want to be published to the Class Notes section of The Bridge, the College's magazine for alumni, parents and friends (messiah.edu/alumni/sendnews).

To update your email address, please contact our administrative assistant, Jean McCauslin, at jmccausl@messiah.edu.

Editor: Dr. Marlin Eby (Eby@messiah.edu)

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MESSIAH COLLEGE

ANALYTIC THREADS

Annual newsletter of the Department of Mathematics, Physics and Statistics

Fall 2019

Faculty News

Marlin Eby

On October 20, 2018, Dr. Marlin Eby and his wife Julie welcomed a son into their family when Andrew Johnson married their daughter Heidi.

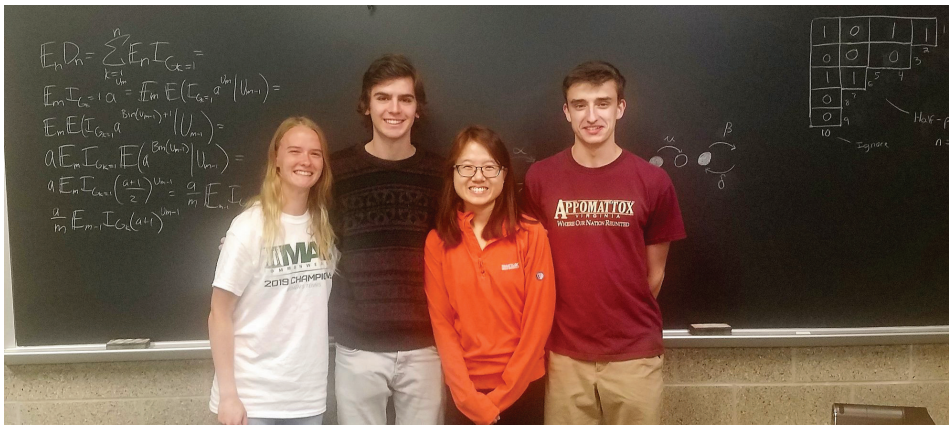
Matthew Farrar

Drs. Matthew and Emily Farrar (Engineering) were blessed on March 20, 2019 with the arrival of Felicity Jean Farrar. Felicity joined big sister Clara (4) and brother Finnian (2).

Messiah's 9th Annual Nobel Prize Seminar was held on December 4, 2018. The Nobel Prize in Physics 2018 was discussed by Dr. Farrar. That prize was awarded to A. Ashkin, G. Mourou and D. Strickland "for groundbreaking inventions in the field of laser physics; optical tweezers and their applications, and the method of generating high-intensity, ultra-short optical pulses."

Drs. Matthew and Emily Farrar presented *Empowering students in our digital age: Creating low-cost, highly engaging activities for STEM laboratory courses* at the 2019 Lancaster Learns Conference.

Congratulations to Dr. Farrar on his selection for the second cohort (2019-2020) of Sawyer Digital Proficiency Initiative Fellows at Messiah College. This cohort will explore ways in which technology can support and enhance their pedagogy, thus improving the digital proficiency of their students. These Fellows will participate in a summer intensive where they will gain foundational knowledge similar to that of students who register for the Digital Proficiency Certificate program. Fellows will build upon the intensive as they participate in a professional learning community (PLC) during the academic year. They also agree to share their experience and the results of their project with their peers.



Mathematics student research group, Left to right: Emily Wichert, Daniel Diethrich, Xin-Dee Low, Ryan Althoff

Dr. Farrar, along with Kolkman, K. E. and Fetcho, J. R. published *Features of the structure, development, and activity of the zebrafish noradrenergic system explored in new CRISPR transgenic lines* in The Journal of Comparative Neurology (August 2018). http://doi.org/10.1002/cne.24508

Dr. Farrar mentored Kyler Shea ('19) in his research project on Fluorescence-Rayleigh Correlation Spectroscopy. Dr. Farrar also received a College Equipment Grant ($6,000) from the Spectroscopy Society of Pittsburgh.

Angela Hare

Dr. Angela Hare (Dean of the School of SEH) taught MATH 494 – Senior Mathematics Seminar in Spring 2019.

Niklas Hellgren

In October 2018, Dr. Niklas Hellgren presented Growth of TiBx Thin Films by DC Magnetron Sputtering and High-Power Impulse Magnetron Sputtering: Effect of Pressure and Substrate Temperature at the American Vacuum Society's 65th International Symposium in Long Beach, CA.

Abaz Kryemadhi

Dr. Abaz Kryemadhi directed four students in undergraduate research: Nathan Chan ('20) – *Characterization of New Crystal Detectors for Gamma Ray Studies in Space*, Brandon Weindorf ('21) and Aeowyn Kendall ('20) – *Development of Prototype Cerenkov Detector for High Energy Cosmic Rays*, and Trieu Luu ('19) – *Development of a Compact Cosmic Ray Muon Detector.*

Dr. Kryemadhi presented the work from his sabbatical project, *Search for Exotic Features in Cosmic Ray Showers*, at the Third International Workshop on LHC Results and Related Topics in October 2018 in Tirana, Albania. This workshop was sponsored by the French and Italian Embassies in Albania in addition to CERN (*Conseil Européen pour la Recherche Nucléaire*). He presented the same talk at the annual meeting of Mid-Atlantic Section of American Physical Society in November 2018 at the University of Maryland.

Faculty news, continued on page 2

Creation Station at Esperanza College, Top to bottom: Xin-Dee Low, Ryan Althoff, Daniel Diethrich

Faculty News

Continued from page 1

The 2018-2019 academic year marked the fourth year of Dr. Kryemadhi's 2016-2019 Templeton Foundation Grant. He is working with Dr. Robin Collins (Philosophy) to further the discoverability livability hypothesis drawing from particle physics.

Amanda Lohss

Dr. Mandy Lohss presented Regular Permutation Graphs in January 2019 at the Joint Mathematics Meetings in Baltimore.

Dr. Lohss, with P. Hitczenko, published *Probabilistic Consequences of some Polynomial Recurrences* in Random Structures and Algorithms (October 2018). https://doi.org/10.1002/rsa.20820

Supported by an NSF (National Science Foundation) grant, Dr. Lohss worked with a team of four students – Ryan Althoff ('21), Daniel Diethrich ('19), Xin-Dee Low ('19), and Emily Wichert ('19) – to write a paper entitled *Expected Value of Statistics on Type-B Permutation Tableaux*. This paper has been submitted for publication.

In February 2019, Dr. Lohss and three students – Ryan Althoff ('21), Daniel Diethrich ('19), and Xin-dee Low ('19) – organized a table on the Menger Sponge for the community event *Creation Station* at Esperanza College in Philadelphia.

Creation Station at Esperanza College, Top Photo - Left to right: Xin-Dee Low, Daniel Diethrich, Ryan Althoff, Alexander Vetter (Villanova student), Bottom Photo - Top to bottom: Xin-Dee Low, Daniel Diethrich, Ryan Althoff

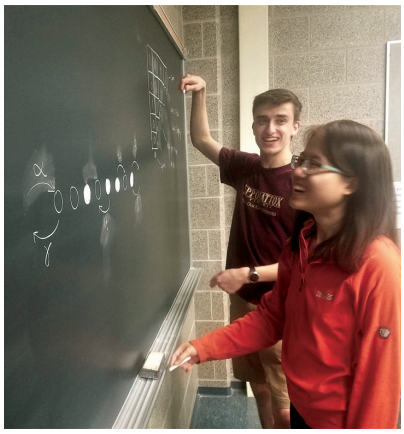
Douglas Phillippy

Dr. Doug Phillippy attended the 23rd Meeting of the Association of Christians in the Mathematical Sciences at Indiana Wesleyan University from May 29 through June 1, 2019. He gave a talk entitled *Glimpses of God through a Mathematician's Eyes.* Messiah alumni in attendance were Ray Rosentrater ('73), Owen Byer ('89), and Nick Zoller ('03).

Dr. Phillippy and his wife Deb welcomed two daughters into their family this year. Son Michael married Briana Eshleman on November 11, 2018, and son Matthew married Joanna Cathone on June 30, 2019. Both brides are Messiah graduates.

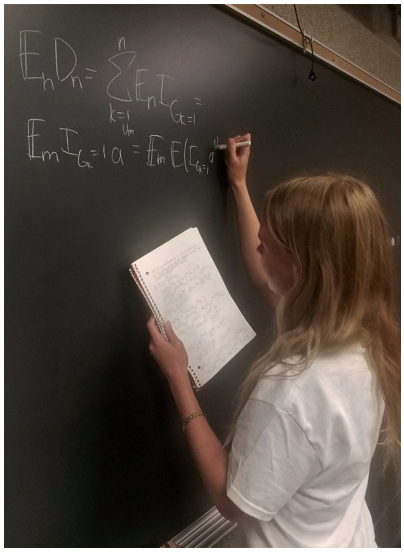
Samuel Wilcock

In June 2019, Dr. Sam Wilcock was an eleventh-time participant in the Statistics AP Reading held in Kansas City, MO. He joined these departmental alumni in that endeavor: Doug Tyson ('92), Leigh (Leisenring) Nataro ('92), Kevin Robinson ('93), Bryan Crissinger ('97), and Erica (English) Chauvet ('01).



Mathematics Research Group, Ryan Althoff and Xin-Dee Low

Mathematics Research Group, Xin-Dee Low and Daniel Diethrich



Mathematics Research Group, Emily Wichert

Student News

Honors

- Congratulations to the Department's top scorer on the *Mathematics Major Field Test*, **Alexander Sredenschek '19** *(right)*! Alex was also the Department's top scorer on the *Physics Major Field Test*.
- **Xin-Dee Low** graduated with department honors in Mathematics. Her thesis was entitled *Tweet the Bridge of Polarization? Two-Way ANOVA Test on the U.S. Political Partisanship*.

- **Kyler Shea** *(right)* graduated with department honors in Physics. His thesis was entitled *Neutron Detection with Boron Carbide Coated Plastic Scintillator*.
- **Alexander Sredenschek** graduated with department honors in Physics. His thesis was entitled *Co-sputtered TiBx Thin Films*.
- **Emily Wichert** graduated with department honors in Mathematics. Her thesis was entitled *Solutions to the Wave Equation*.

- **Brooke Firestone '20** *(right)* (women's soccer) was named First Team Co-SIDA Academic All-District, an award that honors student-athletes for their abilities in the classroom and on the field. Brooke also went on to earn Third Team Academic All-American accolades.

- **Leanne Weaver '19** *(right)* ran the 6K race in the 2018 NCAA Division III Cross Country Championships hosted by the University of Wisconsin – Oshkosh in November. It was her first-ever appearance in the national championships.

Presentations

- **Xin-dee Low '19** presented *Social Media, 2018 Mid-Term Election, and Peacemaking* at the 2019 Messiah Humanities Symposium in February.
- In March 2019, **Ryan Althoff '21**, **Daniel Diethrich '19**, and **Emily Wichert '19** presented *Statistics on Type-B Permutation Tableaux* at the Spring Meeting of the MAA – EPaDel held at King's College.

Spring EPaDel meeting, Left to right: Ryan Althoff, Emily Wichert, Daniel Diethrich

Presentations at the 16th Annual Symposium of the School of Science, Engineering, and Health on May 3, 2019

Mathematics

- **Daniel Diethrich '19**: *The Shannon Switching Game*

- **Olivia Essig '20** *(right)*: *Partial Differential Equations and Fourier Series*
- **Brooke Firestone '20**: *Properties of Adjacency and Incidence Matrices*
- **Xin-dee Low '19**: *Tweet the Bridge of Polarization? Two-Way ANOVA Test on the U.S. Political Partisanship*

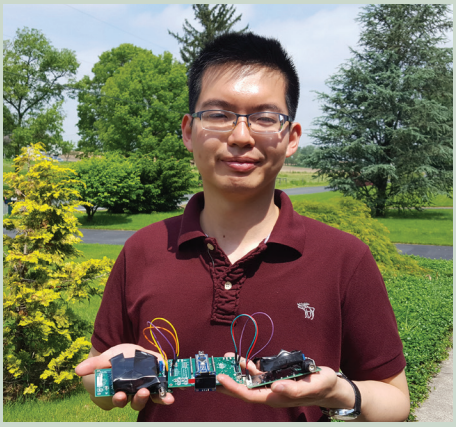
- **Amanda Petersen '19** *(right)*: *Sudoku Puzzles and Graph Coloring*
- **Alexander Sredenschek '19**: *Calculus of Variations*
- **Emily Wichert '19**: *Solutions to the Wave Equation*
- **Ryan Althoff '21**, **Daniel Diethrich '19**, and **Emily Wichert '19**: *Statistics on Type-B Permutation Tableaux*

Student News

Continued from page 3

Physics

- **Nathan Chan '20**: *Characterization of New Crystal Detectors for Gamma Ray Studies in Space*
- **Trieu Luu '19** *(below)*: *Development of a Compact Cosmic Ray Muon Detector*
- **Kyler Shea '19**: *Fluorescence-Rayleigh Correlated Burst Analysis Spectroscopy for Quantification of Ultra-low Concentration Species*
- **Alexander Sredenschek '19**: *Growth of Titanium Boride Thin Films by Magnetron Co-sputtering*
- **Brandon Weindorf '21** and **Aeowyn Kendall '20** *(right)*: *Development of Prototype Cherenkov Detector for High Energy Cosmic Rays*



Trieu Luu with his prototype compact cosmic ray muon detector

Brandon Weindorf and Aeowyn Kendall with their prototype Cherenkov detector

Summer 2019 Activities: MPS Discipline-Related

- **Aeowyn Kendall '20** participated in a Physics/Aerospace Engineering (LAUNCH-UAS) REU (Research Experiences for Undergraduates) at Iowa State University.
- **Bailey Rhodes '20** *(right)* participated in a Physics (Material Science) REU at The University of Texas at Austin.

- **Kyler Shea '19** had a Physics internship in Penn State College of Medicine Department of Radiology (Division of Health Physics).
- **Morgan Zimmerman '21** *(right)* had a Biostatistics internship in Penn State College of Medicine Department of Public Health Sciences.

Class of 2019: Employment and Education Placements

(To Date)

- **Laura Bigelow** *(right)* (Mathematics; Music and Philosophy minors): uFinancial in Mechanicsburg, PA – Administrative Assistant
- **Xin-Dee Low** (Mathematics and Peace & Conflict Studies; History minor): SUARAM in Malaysia – Assistant Program Coordinator
- **Amanda Petersen** (Mathematics; Secondary Teaching Certification): Wheaton High School in Silver Spring, MD – Mathematics Teacher
- **Kyler Shea** (Physics): Medical Physics (MS) at University of Florida
- **Alexander Sredenschek** (Mathematics and Physics): Physics (PhD) at The Pennsylvania State University
- **Emily Wichert** (Mathematics; Statistics and Computer Science minors): Deloitte in Mechanicsburg, PA – Solution Analyst

Department News

The Department of Mathematics, Physics, and Statistics houses six majors: Actuarial Science, Mathematics, Mathematics-with-Certification, Physics (B.A.), Physics (B.S.), and Physics-with-Certification. It also houses three minors: Mathematics, Physics, and Statistics. Full-time faculty members are Dr. Eby, Dr. M. Farrar, Dr. Hare (Dean of the School of SEH), Dr. Hellgren, Dr. Huang, Dr. Kryemadhi, Prof. Lehman, Dr. Lohss, Dr. Phillippy, and Dr. Wilcock (Chair of the Department of MPS).

Address Reminder

Use the following address format to contact a faculty member by regular mail:

Name of faculty member
One College Avenue, Suite 3041
Mechanicsburg, PA 17055-6804

MPS Department Graduates

Six students graduated in December 2018 and May 2019 with majors in the MPS Department. Two of these had two majors: Mathematics with Physics and Mathematics with Peace and Conflict Studies. Here is the breakdown by major:

Mathematics: 5
Physics (BS): 1

Math Club: Mathematics Education career session, Left to right: Dr. Lohss, Jennifer (Zeigler) Barnhart, Kayla Flemmens, Kelly Mackin, Ian Parzyszek, Reece Horne, Emily Decker, Oliva Tamm

Program News

Actuarial Science

In Fall 2017, the Department of Mathematics, Physics, and Statistics launched the Actuarial Science (BS) major and enrolled its first majors.

We are building an Actuarial Science Resource List of Messiah College graduates who are working, or have recently worked, at any level in the actuarial science field. If you are one of these individuals and Dr. Eby has not already contacted you about having your name included on that list, please email him at eby@messiah.edu. Sometimes a student has a question that is best answered by a professional actuary. It is helpful for us and them if we can refer them to you and they can ask their question directly. We also hope that some of you, if your logistics allow, will be able to visit us sometime to meet with and speak to our students. Please do not feel any pressure from us to be involved more than you wish or are able to. Also, if you have not yet been in communication with Dr. Eby about internship possibilities with your organization, please contact him. We need to make internship placements beginning with the Spring 2020 semester.

Mathematics

With Dr. Lohss as advisor, the Math Problem-Solving Group was quite busy this year with these activities:

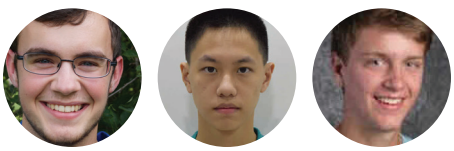
- **Solving the Rubik's Cube**
- **Mathematical Card Tricks**
- **Cryptology Scavenger Hunt:** Dr. Lohss organized a scavenger hunt for the students in which each station had an encrypted code along with a description and brief historical background of the cipher used.
- **Careers in Mathematics:** Two Messiah College alumni spoke in a panel session focusing on Mathematics Education.

Physics

The Physics Club presented the Funny Physics Phenomena Demo Show on May 3, 2019. Like previous shows, it was a rousing success. After the show, there were some hands-on demonstrations in the Frey Hall First Floor Lobby.

Three students were inducted into the Sigma Phi Sigma Physics Honors Society: **Chris Benner '20**, **Nathan Chan '20**, and **Keller Martin '20**.

Two courses were added to the Physics major: PHYS 317 – Optics and ENGR 212 – Programming for Engineers. PHYS 317 will be offered for the first time in Fall 2019 and will be taught by Dr. Farrar.



Left to right: Chris Benner, Nathan Chan, and Keller Martin

Alumni Campus Presentations

Jennifer (Zeigler) Barnhart ('04) and Olivia Tamm ('18)

Jennifer Barnhart and Olivia Tamm spoke in the Math Problem-Solving Group *Careers in Mathematics Series* in March. This event focused on Mathematics Education.

Collaboratory News

Staff and students from the MPS Department continue to be heavily involved in projects within the Collaboratory for Strategic Partnerships and Applied Research (messiah.edu/collaboratory).

Dr. Matthew Farrar continued as project mentor for the Diagnostics of Viral Disease Project which is targeted towards determining viral loads in developing countries with endemic HIV infections. This year, two students traveled to Zambia.

This past year, the SVOR (Straight Vegetable Oil Research) Collaboratory Project group completed its work and Dr. Phillippy transitioned from his role as an advisor for that group to an advisor for one of the Collaboratory's Discipleship Communities. SVOR prepared a work product for Messiah alumnus Matthew Walsh '00 who now serves as a missionary in Burkina Faso.

Opportunities

Future Events

Friday, May 1, 2020

School of Science, Engineering, and Health 17th Annual Symposium

The MPS Department's involvement in an event like this began as the School of Mathematics, Engineering, and Business (MEB) Scholarship Day. It then became the MEB Student Scholars' Expo. With the formation of the School of Science, Engineering, and Health, it became the School of Science, Engineering, and Health Annual Symposium. If you live within driving distance of the College, we encourage you to visit this symposium which is always held on the last Friday of the spring term and features student (mostly) and staff presentations. There is no registration fee and snack breaks are provided. For details including abstracts, check the SEH School website in Spring 2020 (messiah.edu/info/20729/about_the_school/1220/seh_symposium).

Request for Internship Opportunities

Does your employer hire interns in mathematics, physics, statistics, or actuarial science? Our Actuarial Science majors are required to complete an internship. Also, our majors often pursue minors in Business, Economics, or Statistics and are seeking internships in their third and fourth years. Please inform the MPS Department of such opportunities by emailing Dr. Wilcock (swilcock@messiah.edu). Even if you live far from Messiah, we may have a student from a nearby hometown interested in a summer internship.

Support Opportunities

Your continuing support of Messiah College in all ways is greatly appreciated. With respect to financial support, some of you may wish to target donations to specific projects related to the Department. Of course, your gift is doubled when your employer has a matching gift program. Consider a gift to the College that is earmarked as described below. Send your tax-deductible gift – check made payable to Messiah College – to Office of Development, One College Avenue, Suite 3013, Mechanicsburg, PA 17055-6804.

- To make a donation to the Department of Mathematics, Physics, and Statistics, put *MPS Dept.* on the memo line of your check.
- To support the Collaboratory Diagnostics of Viral Disease project, put *Collab. – DVD project* on the memo line of your check.
- The SEH School has an enrichment fund that is used to fund student travel to out-of-state academic conferences to present their work. This fund rolls over year to year, so it is a great place for one-time gifts. Donors should specify *SEH School – Enrichment Fund*.
- Online contributions to the Dr. Gerald D. Hess Research Fund for the Natural Sciences can be made at messiah.edu/HessFund. This fund allows for direct support of student and faculty research, including research supplies and conference travel, for students studying Physics.

If you are interested in contributing to a scholarship for students in the MPS Department, contact the Office of Development. It takes $25,000 to underwrite (seed) a scholarship.

If you are interested in contributing to an endowed scholarship chair for faculty members in the MPS Department, contact the Office of Development. It takes $2 million to underwrite an endowed scholarship chair.

Opportunities for Adjunct Teaching at Messiah College

Are you, or is someone you know, interested in teaching Mathematics or Physics at Messiah College? Interested persons with at least a master's degree in a related field are encouraged to send their resume and statement of interest to Dr. Wilcock at One College Avenue, Suite 3041, Mechanicsburg, PA 17055-6804. The MPS Department often needs part-time adjunct instructors to teach general education courses, and we welcome applications from alumni and their friends and family.

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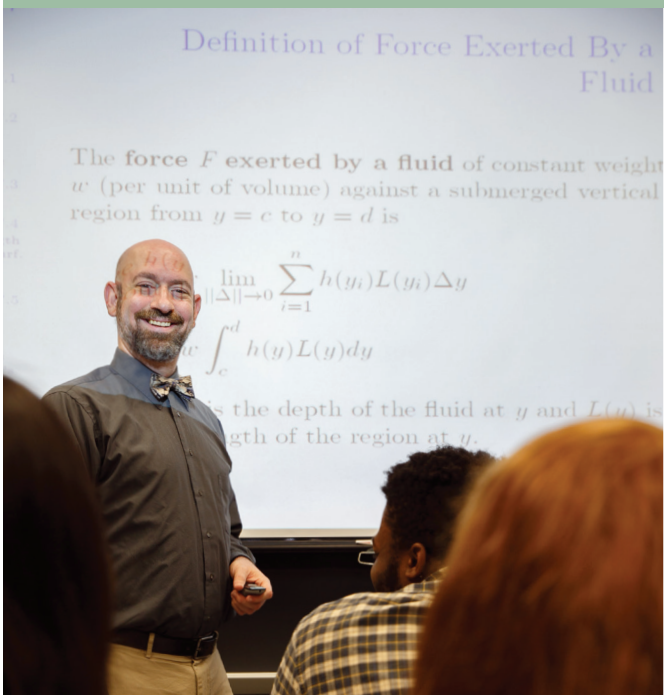

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Parting Thoughts

We hope that all is well with you and your families. We enjoy receiving updates and having you visit us at Messiah. However, we will generally not publish your updates. Since your circle of connections at Messiah College was bigger than the MPS department, we encourage you to send the updates that you want to be published to the Class Notes section of The Bridge, the College's magazine for alumni, parents and friends (messiah.edu/alumni/sendnews).

To update your email address, please contact our Administrative Assistant, Alisa Sentz, at asentz@messiah.edu.

Editor: Dr. Marlin Eby (Eby@messiah.edu)

MESSIAH UNIVERSITY

ANALYTIC THREADS

Annual newsletter of the Department of Mathematics, Physics and Statistics

Fall 2020

Due to new institution and department names, this Analytic Threads is the last annual newsletter of the Department of Mathematics, Physics, and Statistics (MPS) at Messiah University. It is sent annually to alumni and is also available electronically at https://www.messiah.edu/info/23562/news
Since Messiah became a virtual campus on March 25, numerous activities that would have been reported in this newsletter were cancelled. You may assume that missing items are not included for this reason.

Faculty News

Marlin Eby

On August 24, 2019, Dr. Marlin Eby and his wife Julie welcomed a son into their family when Casey Patrizio married their daughter Dr. Rachel in Fort Collins, CO.

Dr. Eby and daughter Rachel

Dr. Niklas Hellgren

had significant publication success in 2019-2020.

- With coauthors J. Thörnberg, I. Zhirkov, M.A. Sortica, I. Petrov, J.E. Greene, L. Hultman, and J. Rosen, he published *High-Power Impulse Magnetron Sputter Deposition of TiBx Thin Films: Effects of Pressure and Growth Temperature* in Vacuum (2019).
- With coauthors H. Harikrishna, S.T. Huxtable, I. Ben Shir, S. Kababya, A. Schmidt, D. Dutta, M. Liu, D. Gidley, W.A. Lanford, C. Ege, E. Mays, J. Bielefeld, and S. King, he published *Thermal Conductivity-Structure-Processing Relationships for Amorphous Nano-porous Organo-Silicate Thin Films* in Journal of Porous Materials (2020).
- With coauthor, J.R. Shallenberger, he published *Zinc Selenide Analyzed by XPS* in Surface Science Spectra (2020).
- With coauthors M.A. Steves ('17), J.R. Shallenberger, S.K. O'Boyle ('19), E. Mellott ('20), and A.R. Noble, he published *Effect of Etching on the Oxidation of Zinc Selenide Surfaces Characterized by X-ray Photoelectron Spectroscopy* in Applied Surface Science (2020).

The Nobel Prize in Physics 2019 was discussed by Dr. Kryemadhi

Abaz Kryemadhi

Three students participated in undergraduate research with Dr. Abaz Kryemadhi: Nathan Chan ('20) and Brandon Weindorf ('21) in *Development of Python Interface for CERN Data Acquisition Board DRS4* and Brandon Weindorf ('21) and Aeowyn Kendall ('20) in *Development of Prototype Cerenkov Detector for High Energy Cosmic Rays*.

Dr. Kryemadhi presented *Development of a Water Cherenkov Detector Prototype with Wavelength Shifters and Silicon Photomultiplier Readout* at the 36th International Cosmic Ray Conference in Madison, WI in July 2019.

Dr. Kryemadhi, along with B. Weindorf ('21), A. Kendall ('20), T. Luu ('19), and H. Hawbecker, published *Development of a Water Cherenkov Detector Prototype with Wavelength Shifters and Silicon Photomultiplier Readout* in Proceedings of Science (July 2019).

He participated in a workshop with a small group of physicists at CERN Geneva, Switzerland in January 2020. The workshop focused on new detectors and new techniques in high energy particles and dark matter.

Dr. Kryemadhi, along with Dr. Matthew Farrar, was awarded a NASA PA Space Grant Consortium for *Construction of a*

Faculty news, continued on page 2

Faculty News

Continued from page 1

Detector Prototype for High Energy Gamma Rays. The grant amount for this year was $7,711 which funded the project including fellowships of $500 each for three students working on the project: Aeowyn Kendall ('20), Brandon Weindorf ('21) and Alan Mokris ('22).

Messiah's 10th Annual Nobel Prize Seminar was held in December 2019. The Nobel Prize in Physics 2019 was discussed by Dr. Kryemadhi. *The Nobel Prize in Physics 2019 was awarded "for contributions to our understanding of the evolution of the universe and Earth's place in the cosmos" with one half to James Peebles "for theoretical discoveries in physical cosmology", the other half jointly to Michel Mayor and Didier Queloz "for the discovery of an exoplanet orbiting a solar-type star."* https://www.nobelprize.org/prizes/physics/2019/summary/

Amanda Lohss

Drs. Mandy and Shane Lohss welcomed McKenzie Jade on September 20 – one day before her daddy's birthday. She weighed in at 7 pounds - 10 ounces.

Drs. Shane and Mandy Lohss with McKenzie

Douglas Phillippy

Dr. Doug Phillippy published *A Glimpse of God through Mathematics* as the lead article in God and Nature (Fall 2019).

Congratulations to Dr. Phillippy for his outstanding performance in the Harrisburg Marathon on November 10 finishing third in his age class! This was his 8th marathon and his time qualified him for the 2021 Boston Marathon.

Samuel Wilcock

In June 2020, Dr. Sam Wilcock was a twelfth-time participant in the Statistics AP Reading held virtually this year due to COVID-19. He joined these departmental alumni in that endeavor: Doug Tyson ('92), Leigh (Leisenring) Nataro ('92), and Erica (English) Chauvet ('01).

MPS Hike (November 4)

MPS Hike (November 4)

Retired Faculty News

Lamarr Widmer

Dr. Lamarr Widmer enjoyed being back in the classroom for one class each semester: *Algebraic Structures* (Fall) and *Linear Algebra* (Spring). Outside of the classroom, he continued volunteering at the food pantry of New Hope Ministries.

Collaboratory News

Beginning July 1, 2020, the Collaboratory for Strategic Partnerships and Applied Research was restructured into the Department of Engineering. It is now an engineering-focused yet interdisciplinary service organization pursuing the mission of increasing hope and transforming lives through real-world application of professional disciplines, Christian discipleship, and partnership with marginalized communities.

MPS Hike (November 4)

Student News

Honors

- **Brooke Firestone ('20)** was named Forward of the Year and earned All-American and Academic All-American honors in women's soccer. She led her team to its sixth NCAA Division III national championship.

- **Reece Horne ('21)** was awarded the 2020-2021 Ernest L. Boyer, Sr. Teacher Scholarship.

- **Aeowyn Kendall ('20)** and **Brandon Weindorf ('21)** were inducted into the Sigma Pi Sigma Physics Honors Society.

Summer 2020 Activities: MPS Discipline-Related

- **Sarah Hartman ('22)** had a Supply Chain Team Internship (in-person initially then virtual) at Clark Associates in Lancaster, PA.

- **Sarah Kelchner ('22)** had an internship (virtual initially then in-person) on a team in the Space Exploration Sector at Johns Hopkins Applied Physics Laboratory in Laurel, MD.

- **Aeowyn Kendall ('20)** worked on the project (virtual), A Mathematical Model of Score Probabilities, at Messiah University under the direction of Dr. Doug Phillippy.

- **Aeowyn Kendall ('20)** worked on the project (virtual), Fine-Tuning for Scientific Discovery, at Messiah University under the direction of Dr. Robin Collins.

- **Ian Parzyszek ('21)** was accepted into a Summer Institute for Research Education in Biostatistics (SIBS) REU (Research Experiences for Undergraduates) (in person) at North Carolina State University and Duke University. However, it was cancelled due to COVID-19.

Class of 2020: Employment and Education Placements (to date)

- **Daniel Diethrich** (Mathematics and Music with Commercial concentration: NAVSUP (Naval Supply Systems Command) in Mechanicsburg, PA – Operations Research Analyst

- **Sean Donaldson** (Physics with Secondary Teaching Certification): Big Spring School District in Newville, PA - Chemistry & Physics Teacher

- **Olivia Essig** (Mathematics with Secondary Teaching Certification): Steel City Academy in Gary, IN – High School Mathematics Teacher

- **Caroline Everett** (Mathematics): Cigna in Bloomfield, CT – IT Systems Analyst

- **Brooke Firestone** (Mathematics with Secondary Teaching Certification): Dover Middle School in Dover, PA – 7th Grade Mathematics Teacher

- **Aeowyn Kendall** (Physics): / Earth Sciences (MS) at University of New Hampshire.

- **Gavin Reich** (Mathematics; Education and Computer Science minors): Dell Boomi in Chesterbrook, PA – Platform Consultant

- **Alex Scheib** (Mathematics with Secondary Teaching Certification): Central Dauphin High School in Harrisburg, PA – Mathematics Teacher

- **Brendan Turner** (Mathematics): Data Science (MS) – Grand Canyon University

MPS Back-to-School Kickoff (September 21)

Program News

Mathematics

Beginning with 2020-2021, MATH 195 (*First Year Mathematics Seminar*) and MATH 494 (*Senior Mathematics Seminar*) will be replaced by these three courses.

- MATH 196 – *Mathematics Seminar* (2 credits): An introduction to and overview of the discipline of Mathematics. Readings, discussion and written work focus on building problem solving skills, vocational awareness, and the relationship between faith and Mathematics. Offered every year in the Fall semester.
- MATH 198 – *Introduction to Mathematical Proof* (2 credits): Students will learn to read, understand, and produce mathematical proofs. Readings, discussion, and written work focus on logic, techniques of proof, classical mathematical proofs, and axiomatic systems. Offered every year in the Spring semester.
- MATH 496 – *Mathematics Capstone* (2 credits): Senior capstone course emphasizing independent research, professional development, contributions of Mathematics to culture, and discipline-specific issues of Christian faith and vocation. Offered every year in the Spring semester.

Mathematics Club: A celebration of Pi Day

Mathematics Club: Welcome Back Pizza Party in September 2019

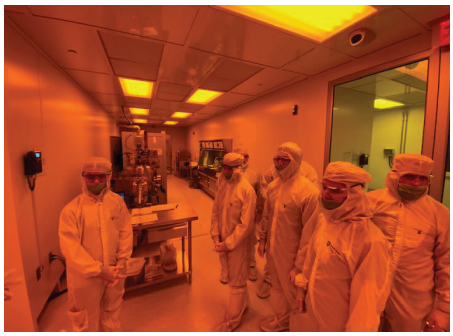
Mathematics Club: Exploring some mathematical puzzles

Physics

The Physics Club took a field trip to Penn State and toured the Breazeale Nuclear Reactor Lab and the Materials Research Institute. In addition, they had lunch with some Messiah alumni and finished the day with ice cream at the Berkey Creamery.

Beginning in Spring 2021, this new course will be offered.

- PHYS 317 – *Optics* (3 credits): The course presents a foundation for classical optics, including Maxwell's equations, plane waves, Gaussian beams, diffraction, optical transfer functions, interference, polarization, dichroism, and image formation. In addition, applications to modern optics, including nonlinear and quantum optics, will be considered. Offered odd years in the Spring semester.



Physics Club: Gowned up in the clean room of the nanofabrication facility in the Materials Research Institute

Physics Club: Outside the Nuclear Reactor Lab (no pictures allowed inside). From the left: Samantha Neal, Dr. Farrar, Sean Donaldson, Aeowyn Kendall, Brandon Weindorf, Nate Chan, and Jeff Gao.

Statistics

Revisions were made to the Statistics curriculum to allow students who have not taken a calculus course to complete a Statistics minor. In the past, a student completed a Statistics minor by beginning with STAT 291 (which has a prerequisite of a first course in calculus) then in subsequent terms STAT 292 and four upper-level STAT courses. Some course titles were also changed to better reflect the current course content.

STAT 269 and STAT 281 are one-term introductory courses for nonmajors. With the revised curriculum, a student who completes either of these two courses may skip STAT 291 and take STAT 292. With the exception of STAT 417, any STAT course that had a prerequisite of STAT 291 now has a prerequisite of STAT 291, STAT 269, or STAT 281.

These are the ten currently catalogued Statistics courses.

- STAT 269 *(Introductory Statistics)*
- STAT 281 *(Applied Statistics for Management)*
- STAT 291 *(Probability & Statistics)*
- STAT 292 *(Inferential Statistics)*
- STAT 324 *(Advanced Statistical Methods)*
- STAT 325 *(Experimental Design)*
- STAT 331 *(Nonparametric Statistical Analysis)*
- STAT 345 *(Time Series Analysis)*
- STAT 346 *(Operations Research)*
- STAT 417 *(Mathematical Statistics)*

Department News

Beginning in Fall 2020, the Department of Computer and Information Science and the Department of Mathematics, Physics, and Statistics will combine into a new department, the Department of Computing, Mathematics, and Physics (CMP).

This new department includes 13 full-time faculty members, the 10 majors (and some associated minors) of Actuarial Science (BS), Computer and Information Science (BS), Computer Science with Teaching Certification (BA), Cybersecurity (BS), Digital Media (BA), Mathematics (BA), Mathematics with Teaching Certification (BA), Physics (BA, BS), Physics with Teaching Certification (BA), and a minor in Statistics.

Dr. Matthew Farrar has agreed to serve as department chair of the CMP department, with unanimous support from faculty in the respective departments. Sincere thanks to Drs. Scott Weaver and Samuel Wilcock for their leadership of the CIS and MPS departments and for their helpful perspective and support for the upcoming merger.

Use the following address format to contact a faculty member by regular mail.

Name of faculty member
One University Avenue Suite 3041
Mechanicsburg, PA 17055-6804

In Memory

Clifford Wagner

We were saddened to hear of the death of Dr. Clifford Wagner on March 1, 2020. He taught Mathematics at Messiah for one year (2000-2001). His obituary is here: https://www.rothermelfuneralhome.com/obituary/Clifford-Wagner

Dr. Gene Chase provided the following information about his professional life that was not mentioned in his obituary.

- He was a **Statistics educator.** He wrote a UMAP (Undergraduate Mathematics and Its Applications) module on Simpson's Paradox, and he delivered a talk at the 2015 ACMS (Association of Christians in the Mathematical Sciences) meeting, *10 Statisticians, 20 Slides, and 30 Centuries*.
- He was a **computer scientist.** He coauthored the book, C and UNIX: Tools for Software Design.
- He was a **mathematician.** When he taught at Messiah, he was so used to teaching large classes at Penn State – Harrisburg that he found a way to generate individual quizzes for each student by varying the numbers in the problems, but varying them in such a way that the problems still came out with nice numbers as answers.

Future Event

School of Science, Engineering, and Health Symposium 2021

Friday, April 30

The CMP Department's involvement in an event like this began as the School of Mathematics, Engineering, and Business (MEB) Scholarship Day. It then became the MEB Student Scholars' Expo. With the formation of the School of Science, Engineering, and Health, it became the School of Science, Engineering, and Health Annual Symposium. If you live within driving distance of the University, we encourage you to visit this symposium which is always held on the last Friday of the spring term and features student (mostly) and staff presentations. There is no registration fee and snack breaks are provided. For details including abstracts, check the SEH School website: https://www.messiah.edu/info/20198/school_of_science_engineering_and_health in Spring 2021.

From the Editor

Thank you so much for your prayers, kind words, and support as Julie and I travelled our COVID-19 road which began in early March. Special thanks to Dr. Wilcock who picked up my load while I was on leave and to Dr. Hare who picked up part of Dr. Wilcock's chair load.

In early summer, Julie and I were both retested and tested NEGATIVE. This means that the live virus cells (contagious) were gone and the dead virus cells (not contagious) were also gone. At that time, we were then part of the safest portion (for us and others) of the population with respect to COVID-19. We praise God for that! While the main part of our recoveries is past, we are still struggling to regain physical and emotional strength.

In June, our pastor interviewed us about our experience. The complete interview can be found here: https://www.youtube.com/watch?v=4ftd_emCXzw

To God be the glory!

Julie & Marlin Eby

Opportunities

Request for Internship Opportunities

Does your employer accept interns in Actuarial Science, Computer and Information Science, Cybersecurity, Digital Media, Mathematics, Physics, or Statistics? Our Actuarial Science majors are required to complete an internship. Also, our majors often pursue minors in Business, Economics, or Statistics and are seeking internships in their third and fourth years. Please inform the CMP Department of such opportunities by emailing Dr. Farrar (mfarrar@messiah.edu). Even if you live far from Messiah, we may have a student from a nearby hometown interested in a summer internship.

Support Opportunities

Your continuing support of Messiah University in all ways is greatly appreciated. With respect to financial support, some of you may wish to target donations to specific projects related to the Department. Of course, your gift is doubled when your employer has a matching gift program. Consider a gift to the University that is earmarked as described below. Send your tax-deductible gift – check made payable to Messiah University – to Office of Development, One University Avenue, Suite 3013, Mechanicsburg, PA 17055-6804.

- To make a donation to the Department of Computing, Mathematics, and Physics, put CMP Dept. on the memo line of your check.
- The SEH School has an enrichment fund that is used to fund student travel to out-of-state academic conferences to present their work. This fund rolls over year to year, so it is a great place for one-time gifts. Donors should specify SEH School – Enrichment Fund.
- Online contributions to the Dr. Gerald D. Hess Research Fund for the Natural Sciences can be made here: http://www.messiah.edu/HessFund. This fund allows for direct support of student and faculty research, including research supplies and conference travel, for students studying Physics.

If you are interested in contributing to a scholarship for students in the CMP Department, contact the Office of Development. It takes $25,000 to underwrite (seed) a scholarship.

If you are interested in contributing to an endowed scholarship chair for faculty members in the CMP Department, contact the Office of Development. It takes $2 million to underwrite an endowed scholarship chair.

Opportunities for Adjunct Teaching at Messiah University

Are you, or is someone you know, interested in teaching Computer and Information Science, Mathematics, Physics, or Statistics at Messiah University? Interested persons with at least a master's degree in a related field are encouraged to send their resume and statement of interest to Dr. Farrar at One University Avenue, Suite 3041, Mechanicsburg, PA 17055-6804. The CMP Department often needs part-time adjunct instructors to teach general education courses, and we welcome applications from alumni and their friends and family.

Computing

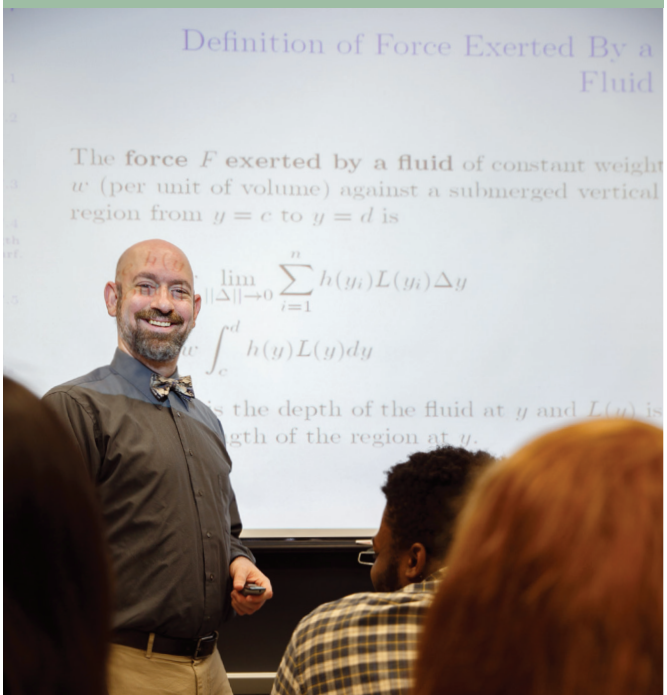
Complete a goal-oriented task.

Computing encompasses the design and development of software and hardware systems for a broad range of purposes - often structuring, processing and managing a multitude of information. All work together to aid in the pursuit of scientific studies, making intelligent systems, and creating and using different media for entertainment and communication. The most important aspect of computer science is problem solving, *an essential skill for life.*

Mathematics

Reason logically to answer challenging questions.

Go beyond the realm of mere facts and numbers as you develop creative problem-solving skills you can apply to complex problems in almost any field. With Messiah's Christian professors as your guides, experience the intricate balance of art and science and learn to maximize both your intuitive and analytical skills. You'll also grow to appreciate how your Christian faith and mathematics complement each other as you acquire the intellectual and spiritual vigor necessary to ***interpret information and solve problems.***



Physics

Probe a universe of interactions.

Study the building blocks of the universe, from quarks to galaxies, and explore the basic laws and forces of nature. Then, with a solid theoretical foundation and hands-on research experience, you may just find yourself mapping out the dark matter in the universe or discovering the optimal atomic structure for next-generation solar cells.

Study complex theories in class, then apply what you've learned through hands-on research or an internship where you'll ***solve problems and serve communities.***

MESSIAH UNIVERSITY

DEPARTMENT OF
COMPUTING, MATHEMATICS
AND PHYSICS

One Unversity Ave
Mechanicsburg PA 17055

Address Service Requested

ANALYTIC THREADS

Analytic Threads is the annual newsletter of the Department of Computing, Mathematics and Physics at Messiah University. It is sent annually to alumni and is also available electronically at the website **messiah.edu/cmp** .

Parting Thoughts

We hope that all is well with you and your families. We enjoy receiving updates and having you visit us at Messiah. However, we will generally not publish your updates. Since your circle of connections at Messiah University was bigger than the CMP department, we encourage you to send the updates that you want to be published to the Class Notes (https://www.messiah.edu/alumni/sendnews) section of The Bridge, the University's magazine for alumni, parents and friends To update your email address, please contact our Administrative Assistant, Alisa Sentz, at asentz@messiah.edu.

Editor: Dr. Marlin Eby (Eby@messiah.edu)